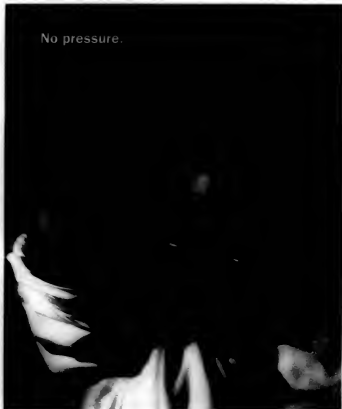




The productivity of one CFO, dozens of VPs  
and hundreds of end users lies in your hands.



**With the leading messaging server behind you, relief is at hand.**

As the industry's current top-selling messaging server<sup>1</sup> and the leader in mail standardization among Fortune 500 companies<sup>2</sup>, Microsoft® Exchange Server is the smart choice for your company's long-term messaging needs. Exchange is also equipped to handle the growing collaborative demands of your office. Which means your people can carry on undisturbed, and you can start tackling your next challenge. To evaluate Exchange Server for yourself, visit us now at [www.microsoft.com/exchange](http://www.microsoft.com/exchange)

**Microsoft**

Where do you want to go today?™

Source: Data during first three quarters Jan. 1-June 30, 1998. ENRIS, Issue 4, 1998. Source: The Forrester Group, July 1998.  
© 1998 Microsoft Corporation. All rights reserved. Microsoft and Where do you want to go today? are registered trademarks of Microsoft Corporation in the United States and/or other countries.

# Briefing

News summary for senior managers

•What happens to the CIOs profiled in *Computerworld*? All kinds of things. Remember the married CIOs? One got international responsibilities, the other became a high-priced consultant. GM's CIO is still looking for more progress but already has saved \$400 million, launched car-buying Web projects, consolidated design and started to revamp the supply chain. And GE CEO Jack Welch is shuffling his top IT staffers, who head up GE's \$450 million-per-year quality program. Page 99

## In this issue

### NEWS

- 4 IT workers fly to Nicaragua to aid victims of Hurricane Mitch with communications and databases to track the injured.
  - 4 IRS outsources key IT infrastructure pieces, having failed on its own.
  - 6 Sun lays out Enterprise JavaBeans plan, but to some it looks preliminary.
  - 6 Users demand longer power supply for laptops, but airlines may be responding better than manufacturers.
  - 12 Vendors forge ahead with real-time chat; user response is lukewarm.
- OPINION**
- 6 Frank Hayes predicts year 2000 mania and an early Windows 2000 debut.
  - 17 Society demands competent, level-headedness from IT for a turbulent year, Allan E. Alter writes.
  - 20 Polls misstate reality when taken alone, but they're fine as part of an overall diagnostic effort, Michael Schrage decides.

### TECHNICAL SECTIONS

#### CORPORATE STRATEGIES

- 21 Gas engineers tap extranet and middleware to help share data on new reserves.
- 21 MovieFone offers predictions of movies' success by mining data on callers who ask about new releases.

#### INTERNET COMMERCE

- 29 Start-up roots DVDs on Web after finding that mailing discs is cheaper than mailing tapes.
- 29 CD measures traffic on the Web to track trends. Surprise—shopping is up.

### THE ENTERPRISE NETWORK

- 37 Oil company saves on remote access costs and ups security with virtual net.
  - 37 Backup fails when files are left open, but there are ways to save them.
- SOFTWARE**
- 93 Java 2 improves, but developers are wary of its graphics and browser support.
  - 93 Mott's speeds R/3 performance with tools that finally pinpoint bottlenecks.
- SERVERS & PCs**
- 97 PCs will fly off the shelves, analysts predict, as users upgrade before the year 2000 shuts them down.
  - 97 Business-card CD contains enough space for a brochure or leave-behind product presentation.

### FEATURES

#### MANAGING

- 99 CIOs make progress pretty quickly, so we checked back with some of those who appeared here in 1998.
- 101 Resources for IT managers.

#### JOB FORECAST '99

- 110 Hiring forecast reveals that IT managers expect relief from the job crunch during 1999.

#### REVIEW CENTER

- 105 Net technology changes from year to year; here's what has come and gone in the past 12 months.

### ETC.

Company Index	189
Editorial Letters	16
How to contact CW	129
Inside Lines	130

### YEAR 2000

Y2K legal traps lie in wait, so CIOs must prepare for when they're sprung, Paul Strassmann warns. 101

Michael Cohn dreams that year 2000 may be no big deal. But he's just kidding. 109

362  
JANUARY  
2000

Online this week

Just in time to pay your holiday bills

Check out our IT-related financial and banking resources - publications, organizations and articles.

COMPUTERWORLD  
computerworld.com/more

# IT rescuers help build crucial E-mail links

## ► Enabling medical info exchange in Nicaragua

Editor's note: In November, Hurricane Mitch killed an estimated 11,000 people in Central America. More were left homeless, cut off from food and medical aid. Computerworld's Mary Beth Welch accompanied three information technology workers from Princeton, N.J.-based Romin Corp. to improve communications at three Nicaraguan hospitals.

By Mary Beth Welch

IT WAS FRIDAY, NOV. 13 — SIX DAYS AFTER Hurricane Mitch ravaged Nicaragua — when we toured Managua, the capital, and four other cities, and quickly learned that medical facilities desperately needed to share information about the crisis.

The Romin team's idea was to set up a database to track storm

survivors [CJW Nov. 16]. But once in Nicaragua, the group worked on a plan to set up network servers among three hospitals, including one in Managua. The goal: to let health care workers at the hospitals and local clinics trade information via E-mail about disease control and medical supplies.

### GIFT OF HOPE

The team members plan to revisit the hospitals in February to finish implementing the project. But they already have delivered hope. Says Dr. Pedro A. Sequera, director of a clinic in Leon, Nicaragua: His son, Peter Sequera, is a Romin help desk administrator on the team.

"Just seeing people volunteering to help has given [medical workers] something to look for-

ward to. Especially for remote areas where they depend on [paper] to be delivered before anything can be done," Dr. Sequera said.

At Hospital Amón Luis Fonseca in Managua, paper piles dominate Dr. José Noel Somarriva Agüero, director general at the hospital, said he has two PCs, including one with an Internet link.

The hospital's records room was crisscrossed with stacks of manila folders stuffed with patient records — as much as the room could hold.

"What we really need is to be able to communicate — share data and medical records with other hospitals and clinics with in the country," Somarriva said.

### PRECIOUS POWER

Cheap, reliable communications would have helped a remote city such as El Salva (population 15,000), about a three-hour drive over dirt roads from Managua. During Hurricane Mitch, El Salva lost electricity — and no power means no refrigerators for needed medical supplies.

On Nov. 19, the Romin team traveled in a jeep through rivers where bridges and roads were

destroyed to install a generator that will prevent blood and other supplies from spoiling — and support a PC with Internet access.

The team from Romin, a tech-

ners for Disease Control and Prevention.

"Keeping people communicating and connected in a natural disaster is the most useful skill we have," McCracken said.



By easing communication among hospitals, members of the Romin team helped hasten the delivery of medical supplies to devastated towns such as Posolteque, Nicaragua

nology market research firm, includes Sequera, Andy Garcia and CIO Bob McCracken. Their plan calls for installing Windows NT 4.0 servers at three hospitals to support message routing and remote access by PC users. They also are using a disease-tracking program provided by the Atlanta-based Gra-

During the trip, team members traveled to Chamezaga's Hospital Espana, where they connected Dr. Luis Callagay's PC to E-mail.

He was scheduled to be linked to Dr. Sequera in Leon, so the two doctors could communicate about patients' medical cases. □

### MICROSOFT MICROSCOPES

- The U.S. Department of Justice wants Microsoft Corp. executive James Allchin to answer questions — which the government claims he ducked in an earlier deposition — about tests the company ran on software that removes the functionality of Internet Explorer from Windows 98. The government filed a motion Dec. 21 in the antitrust case seeking further testimony from Allchin, senior vice president of personal and business systems. Edward Felten, a Princeton University professor and a witness for the government, developed the browser removal program. In his Sept. 29 deposition, Allchin said he couldn't comment on Felten's program because Microsoft's testing of it wasn't complete. Microsoft claims that its browser is an integrated part of Windows and says Felten's program only hid the browser's functionality. The government has accused Microsoft of illegally tying the browser to the operating system. The trial is set to resume Jan. 4.
- Microsoft asked the judge in the Java case for up to two extra months to make its Java products comply with Sun Microsystems Inc.'s specifications. U.S. District Court Judge Ronald Whyte had ordered Microsoft to do the work by mid-February. Microsoft also asked the judge to clarify whether any "independently developed" Java-based products must comply 100% with Sun's rules for the programming language. Microsoft asked that the motion for more time be decided by Jan. 8.
- Online greeting-card maker Blue Mountain Arts won a round in a recent suit against Microsoft. A judge ordered Microsoft to immediately help Blue Mountain recode its greeting cards so that Microsoft's Outlook Express E-mail program stops treating the cards as spam and shunting them to a "junk mail" folder instead of users' regular in-boxes. Hartford House Ltd., Blue Mountain's parent company in Boulder, Colo., sued Microsoft in December, saying the resulting feature could hurt Blue Mountain's business. Outlook Express also treats Microsoft's own online greeting cards as spam. — Kim S. Nash and Patricia Thibodeau



## Private sector to tackle IRS mess

By Patrick Thibodeau  
WASHINGTON

THE INTERNAL REVENUE SERVICE turned to the private sector in December to help reverse a string of failures in its IT modernization program. But in so doing, the IRS may face its biggest challenge yet, managing an outsourcing contract that may be the largest ever signed.

The IRS approved a 15-year contract with a consortium of seven information technology vendors, led by Computer Sciences Corp. (CSC). The IRS isn't providing estimates of the ultimate value of the contract, but some analysts said it may be as high as \$8 billion.

The pact represents a major change in the IRS's beleaguered IT modernization effort. Instead of using contractors to bid piecemeal on IT projects, the IRS is putting the burden on the consortium to develop architectures and strategies for replacing its 30-year-old systems.

The IRS has spent about \$4

billion during the past 15 years to modernize its information systems. But the effort has drawn stinging criticism from Congress and the U.S. General Accounting Office (GAO) for a host of costly mistakes and administrative problems, such as abandoning its \$1.4-billion Document Processing System after spending \$500 million and misplacing 64,000 magnetic tapes that may have contained taxpayer information.

### STRING OF FAILURES

The GAO has issued dozens of reports detailing the IRS's problems, and it plans to study the contract with CSC. "The IRS has failed both ways," said Ron B. Stilleman, the GAO's chief computer and telecommunication scientist. "They have failed in trying to build [systems] themselves, and they have failed in contracting."

The latest effort has its challenges and pitfalls, users and analysts said. "There's a huge contract management job still

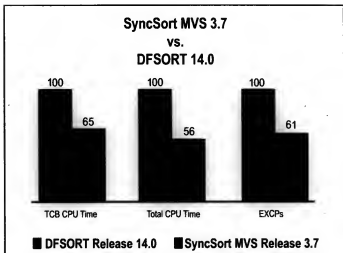
in front of the IRS," said Henry Philcox, a former CIO at the IRS. "Having the expertise to manage the prime vendor is the challenge the IRS now faces."

Some see management land mines in the agreement. The consortium companies can bid against one another for work, and that may lead to problems, warned Patrick McBride, an analyst at Meta Group Inc. in Stamford, Conn. "The last thing you want is potentially warring vendors looking for the next big thing they get."

The length of the contract also has raised eyebrows. But Edward Ziser (ziser@schubert.com), vice president of operations at the U.S. Chamber of Commerce in Washington, said there are benefits to a long contract. "You know that there is going to be a consistent basis for management of those services over time," he said.

The chamber in 1997 signed a 10-year, \$75 million outsourcing deal with Cap Gemini America in New York. □

# SyncSort MVS keeps getting better.



## ■ Better Performance

- 35% less TCB CPU Time than DFSORT
- 44% less Total CPU Time than DFSORT
- 39% fewer EXCPs than DFSORT

## ■ Better Features

- New PARASORT technology reduces elapsed time by up to 33%
- Year 2000 ready

## ■ Better Value

Call now, (201) 930-8200, to arrange a **FREE TRIAL** of SyncSort MVS —  
the leading product for high-performance mainframe sorting and data manipulation.

**syncsort**

50 Tice Blvd., Woodcliff Lake, NJ 07675  
[www.syncsort.com/c8cwm](http://www.syncsort.com/c8cwm)

# Sun's JavaBeans plan stretches to 2001

By Carol Sliva

SUN MICROSYSTEMS INC. last month laid out an Enterprise JavaBeans (EJB) road map that stretches in three phases to beyond 2000.

Corporate developers who would rather wait for stable Java technology said they don't expect the timetable to hamper their development projects. But some may give pause before moving to the eagerly awaited component technology that can cut the amount of server-side Java code they need to write.

"It's got us a little concerned," said David Rudakowski, manager of mainframe technology at AlliedSignal Inc.'s aerospace equipment systems division in South Bend, Ind. "It's almost as if you wouldn't want to be starting into this until it's a little more firm[ed] up."

The Enterprise JavaBeans 1.0 specification emerged in March. But so far, there has been no reference implementation to prove that the spec works and help vendors ensure their products' compatibility.

"Until there's a reference implementation, EJB is likely to

## Sun's Enterprise JavaBeans spec road map

### PHASE ONE

To make security information portable from system to system using Extensible Markup Language. To refine the server-side transaction model to ensure that enterprise data is transmitted intact. Due Q2 1999.

### PHASE TWO

To provide a Connector API, or standard method for any EJB server to connect to back-end systems such as transaction processors and enterprise resource planning systems. Due Q1 2000, with reference implementation due 3 to 6 months later.

### PHASE THREE

To define entity beans, components that automatically map an application's Java code into database and server operations. Due Q4 2000, with reference implementation due 3 to 6 months later.

Sources: Sun Microsystems, Enterprise JavaBeans specification, Sun Microsystems Inc.

[have] interoperability problems," said David Smith, an analyst at Stamford, Conn.-based Gartner Group Inc.

According to Bill Roth, enterprise Java product line manager at Sun, the EJB road map's first phase calls for a spec by the end of June and a final reference implementation by year's end (see chart).

"You can count on this [line item] slipping big-time because each phase is going to run into

its own technological and political issues," predicted Tim Sloan, an analyst at Boston-based Aberdeen Group Inc. "Despite the obvious shortcomings, there are work-arounds that can be put in place today that enable Java to be used in the enterprise."

Electric Boat Corp., for instance, has been developing to the EJB spec. The Groton, Conn., submarine maker had to deal with security holes in the

EJB spec, but it expects to deploy the code soon with IBM's EJB-compliant WebSphere application server, said Tom Rando, a principal investigator at Electric Boat.

Many other companies, however, are inclined to wait for more solid technology.

"I'd rather have a more robust product than have to make a lot of changes and patches on the back end, because they're a lot more expensive there [than on the front end]," said John Melia, senior manager of information technology tools at NationsBank Services Inc. in Chicago. □

# Vendors win early Y2K disputes

By Thomas Hoffman and Craig Stedman

SEVERAL VENDORS, including Andersen Consulting and Macola Software Inc., have chalked up decisive victories in resolving year 2000 disputes.

But legal experts said the victories don't necessarily signal a trend toward pro-vendor decisions in determining year 2000 liability. The rulings were made in lower courts — not at the appellate level, where they would

be handing upon other courts.

"These cases are not setting precedents," said Dean Morehouse, co-chairman of the year 2000 legal practice at Thelen, Marrin, Johnson & Brindley, a San Francisco law firm.

For example, a county court judge in Marion, Ohio, dismissed a suit last month that involved breach of warranty and fraud charges against Macola, a maker of Windows-based financial and manufacturing applica-

tions for small companies.

The suit, filed by a New York law firm, sought free upgrades or reimbursements of upgrade fees for users of an older version of Macola's software that isn't year 2000-compliant. But the judge ruled that the plaintiffs failed to prove that Macola had breached the terms of its software license agreement.

Many of the early year 2000 lawsuits have ended with settlements. Medical Manager Corp., a Mountain View, Calif., maker of financial and administrative software for doctors, agreed in December to settle six of eight year 2000 suits filed against it in various states. The deal requires Medical Manager to pay \$1.455 million into a settlement fund for customers who already bought a year 2000 upgrade.

But also last month, J. Baker Inc., a Canton, Mass.-based apparel retailer, dropped plans to file suit against Andersen Consulting after a Massachusetts mediator concluded that the Chicago-based consultancy had met all its contractual obligations.

J. Baker hired Andersen Consulting in 1989 to customize and install a merchandise management system it had bought from a software vendor that has since gone out of business.

But the contract didn't require the system to be year 2000-ready. In fact, J. Baker had signed off on a section of the contract that revealed that there would be two-digit date fields in the software program, according to an Andersen Consulting spokesman. A spokesman for J. Baker acknowledged that the contract didn't address year 2000 issues, so the retailer decided against litigation. J. Baker has since made year 2000 fixes. □

# Processor to give more laptop power management

By Matt Hamblen

CORPORATE users desire many things from the next generation of laptops, including up-to-date features and lower prices, but often mentioned on their wish lists for 1999 models is longer battery life.

An anticipated chip from Intel Corp., code-named Geyser-

ville, will let notebooks run on two power and performance modes to spare battery life, analysts said. It's expected to appear late in 1999. Although Apple Computer Inc. began offering a similar feature five years ago for its Macintosh notebooks, the technology is new to PCs.

With the new chip, road warriors who need notebooks only

for word processing and E-mail access could sap less power from a battery than when the same machines are docked and plugged in to a power outlet. The laptop could operate as a PC to process a complicated spreadsheet or an engineering drawing quickly, said Ken DuLany, an analyst at Gartner Group Inc. in Stamford, Conn.

The chip would let users "finally be able to have their cake and eat it, too," said J. Gerry Pundy, an analyst at Mobile Insights Inc. in Mountain View, Calif.

"Being able to better manage my power might give me an extra hour when I need it," said Chris Behning, vice president of MIS at General American Corp., a mortgage information provider in Pittsburgh. But Jim Ranager, senior systems administrator at the State Academy of Mississippi, said he would want to test any power-management chip before using it in the field.

"A power-management chip would not be as important to me as a longer-life battery," Ranager said.

Batteries are expected to get longer life but not substantially more in 1999, analysts said.

Also, airlines are lessening the need for long battery life by adding power plugs for computers on planes. For example, US Airways Group Inc. began offering plug-in power at all seats in all classes in November aboard new Airbus A319 planes being added to its fleet. United Air Lines Inc. has power at business-class seats aboard certain aircraft. Delta Air Lines Inc. and American Airlines expect to have laptop power at business and first-class seats within three to four years, analysts said. □

# Intel readies laptop, server chips

By April Jacobs

INTEL CORP. is expected to announce a barrage of processors by April, including a first-time Celeron-based, low-end laptop chip and high-end server chips based on 450-MHz Pentium II Xeon processors.

Intel spokesman Seth Walker confirmed the chips would be out by April but provided no release dates.

The Santa Clara, Calif., chip maker is expected tomorrow to

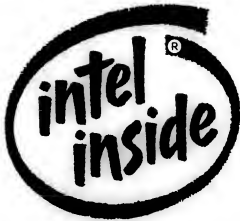
announce new 450-MHz Pentium II Xeon processors for servers with three cache options. The new Xeon will have a choice of 512K, 1M and 2M bytes of cache, vs. the standard 512K bytes of the current Xeon. A larger cache can speed applications such as compiling code and sorting databases.

The new Xeon are a shooin' in the financial world, where transaction processing and heavy data processing eat up as much power as servers can pro-

vide, said Brian Brumit, a director at PricewaterhouseCoopers, an accounting and consulting firm in New York.

A successor to the Pentium II, code-named Katmai, also is due by April. Walker confirmed. It will have enhanced graphics performance and speeds of 400 and 450 MHz.

Separately, expected on Jan. 7 are new mobile PC processors based on 266-MHz Celeron chips. Intel also will offer up a new 300-MHz mobile MMX Pentium chip. Those mobile offerings will address the low-end market. □



**celeron™**

**PROCESSOR**

Look who's in business now.

*Great performance at an exceptional value.*



Looking for a smart buy? Here's today's top pick: the Intel® Celeron™ processor. It gives you quick and responsive performance for today's business applications. At a great value. And because it's from Intel, you get all the compatibility and reliability you've come to expect. To learn more, contact your PC manufacturer, see your local reseller, or visit us on the Web. [www.intel.com/Celeron](http://www.intel.com/Celeron)

**intel.**  
The Computer Inside.™

## FRANKLY SPEAKING

## '99 do's and don'ts

FRANK HAYES

**R**ADAR FOR 1999? What was supposed to be a heads-down, grudge-away-at-Y2K year is shaping up instead as a wild 12 months for IT — with the outside world making plenty of waves inside the IT shop. Here are a few do's and don'ts to help you make it through the year.

**DO** respect Y2K to dominate everything this year — from your own Y2K efforts to a stream of Y2K lawsuits against every hardware and software vendor. But don't expect to gain much from those suits — except maybe a raft of free Y2K software patches offered by vendors hoping to stave off legal threats.

**DON'T** be surprised if Windows 2000 shows up in 1999. Corporate Windows NT users want the new features, and Microsoft will want to field test Win 2K before requiring its fi-

crores to preload it on consumer PCs. **DO** watch out for business partners that unexpectedly install enterprise software packages from SAP, Baan and PeopleSoft. Emergency installations of those big packages may serve as a (relatively) quick fix for Y2K problems. It brags going out of business. But to get those packages working fast, a company may have to rattle-



## Do plan to see Asian economies start their comebacks this year.

cally change its business processes — and that could affect how your systems communicate with them.

**DO** budget for over-charge PC hardware — and even over-enthusiastic people, especially IT workers with hot skills.

Yes, 1999 should be the year of hardware upgrades and lots of training to retain good people, but it probably won't be, until that Y2K project's done.

**DON'T** expect IT age discrimination to ease off in the new year, either. There will be plenty of work to go around in 1999, but IT workers will increasingly be pigeonholed by age. The birthday cake will hit the fan next year as workers battle over who will get to stay once Y2K projects start winding down.

**DO** look into new approaches to creating IT systems. Once we're past all those Y2K fires, the order of the day will be tight user focus, fast payback — and planned obsolescence.

**DON'T** let "open source" software blindsde you. If you allow your developers to modify the source code, be prepared to throw away the whole mess and start over if your programmers aren't extraordinarily disciplined — and compulsive about documenting their changes.

**DO** plan to see Asian economies start their comebacks this year. That may mean extra work for IT if expansion plans or partnerships for your company were put on hold because of international financial problems.

**DON'T** bet on smart cards or cyber-

currency to be widely used for electronic commerce, at least in the U.S. For now, credit cards still rule.

**DO** watch for a continued slow unwinding of U.S. encryption restrictions — with the emphasis on slow. It won't make the free-crypto-for-everybody crowd happy, but easing crypto restrictions should make life easier for companies wanting to do electronic business internationally.

**DON'T** bet on Steve Jobs accepting a permanent job at Apple. (A year ago, people thought I was crazy to make that prediction; now it looks like Jobs will be interim CEO forever.) And don't bet on the Apple iMac to displace PCs on corporate desktops. But within a few years, something will displace those PCs — and most likely it will look a lot like a PalmPilot.

**DO** prepare personally for Y2K zero hour. What's the worst natural catastrophe — hurricane, killer blizzard, flood, earthquake, tornado — that could leave you without electricity, water and phone service for days at a time? If you're prepared for that, you'll likely survive the worst that Jan. 1, 2000, will throw at you. □

Hayes is Computerworld's staff columnist. His Internet address is frank\_hayes@icw.com.

## SHORTS

### Clinton makes Y2K assurance

Even as President Clinton last week announced that the year 2000 issue has been solved for the Social Security Administration (SSA), some observers were warning it was too early for the federal government to make such an assessment, in part because it uses other computers outside the agency to administer some programs, critics said. However, the SSA has been credited with launching the most aggressive federal effort to fix its year 2000 problems, whereas other agencies, such as Energy, Defense and the IRS, have been heavily criticized for not doing enough, soon enough.

### Report details Y2K readiness

Cap Gemini America LLC will today release a report on year 2000 preparedness, based on a survey of 110 Fortune 500 companies and 16 government agencies. The survey has good news and bad news. Holding steady, 74% of those surveyed expected to have more than half of their systems tested and compliant by Jan. 1, 1999. The percentage of companies with a process in place to test code has risen from 16% last quarter to 66%, and 100% of respondents are developing contingency plans compared with only 5% in April.

Driving those plans may be the bad news. According to the survey, 55% of the largest U.S. companies have already experienced a year 2000-related failure — mostly in terms of processing disruptions or financial miscalculations. That figure has been steadily rising all year in Cap Gemini surveys. Nearly all respondents — 98% — expect more such failures this year. Another 95% said minimal difficulties are occurring with greater frequency, while 84% said their cost estimates for fixing the problem were "too low." Also key, the number of companies likely to stop doing business with non-compliant business partners jumped to 65%, up from

60% in the third quarter.

Stella Gniel, a year 2000 analyst at CAP Gemini, said the results aren't surprising. "As companies get further into the issue, they look at how complex the problem is and reduce their estimates for how much [work] they'll have done by the end of the year." Companies need to "focus on an all-out effort in Y2K testing" in 1999, she said, as indicated by the number of year 2000 milestones that are slipping.

### TCP/IP security flaw

The Computer Emergency Response Team (CERT) issued a warning that certain TCP/IP connections are vulnerable to hackers' attacks. Intruders would be able to disrupt service or crash systems once the faulty connection was discovered, the CERT warning said, and remote users also could suffer from system crashes and stalled service. Unix vendors Berkeley Software Design Inc. and FreeBSD Inc. discovered some vulnerable areas and issued security fixes, according to CERT.

### Security disasters barred

A federal judge has issued a preliminary injunction that bars the distribution of products that disable software anti-piracy protection. Lawyers at Brown Reisman Millstein Feld & Steiner LLP, representing CNC Software Inc., said they won the injunction against Pro Solutions Inc. in St. Augustine, Fla., and its Imagine That! Isoblock and Rivadock software.

### Social Security miscalculation

A U.S. Treasury Department Social Security trust fund has been erroneously credited with \$1.4 billion in interest since 1980 because of a computer program that wasn't updated to take market changes into account.

The error also affected other government trust funds, including ones related to Medicare and retirement savings for federal employees. The government will use new calculations for future investments.

### Real-time Java factions to meet

Aonix Corp., a Java tools vendor based in San Diego, will host January's monthly meeting of the real-time Java working group that's been developing a list of requirements for a specification. Following the Jan. 13-15 meeting, a Hewlett-Packard Co.-led splitter group that's been working on a spec for a real-time extension to Java will meet Jan. 14-15.

### Virus disrupts insurer

A computer virus brought down about 1,000 of State Farm Insurance Co.'s 105,000 computers nationwide on Dec. 31. Officials said a Microsoft Corp. Word macro virus affected PCs at regional claims offices and could infect the home computers of people who connect the Bloomington, Ill.-based insurer through the Internet or E-mail.

**SHORT TAKES** Sunburst Hospitality Corp., which owns 87 hotels, signed a five-year, \$4.4 million outsourcing agreement with U.S. Internetworking Inc. in Annapolis, Md., to get new PeopleSoft Inc. financial applications over the Internet by April. ... **SAP AG** disclosed an investment in SpeechWorks International Inc. to aid new SAP customer management software. ... The New York Stock Exchange is planning to invest \$550 million in technology and trading-floor systems as part of a preliminary agreement to keep the exchange in New York City. ... **Herman Air Lines** has signed a 10-year, \$129 million outsourcing contract with IBM Global Services.



TO SUSTAIN LIFE OUT **HERE**, THERE ARE  
A FEW THINGS YOU **MIGHT** WANT TO CONSIDER.



Ice axe.

Safety rope.

Glacier glasses.

Warmth.

## Users call in Oracle team

CONTINUED FROM PAGE 1

Version 3.0 of Oracle CPG, which combines Oracle's financial and process manufacturing software with applications for managing orders, assets and supply chains developed by other vendors.

Oracle said it put a higher priority on new inventory- and order-management features that should be ready in the spring (see chart). But it also is devoting some of its CPG developers to the rollout SWAT team, which is helping early

users with configuration issues and fast-turnaround bug fixes.

The J. M. Smucker Co. in Orrville, Ohio, maker of jams, jellies and other food products, turned on much of Oracle CPG at the start of December, kicking off a corporatewide installation that will continue well into 2000.

Dick Jursa, vice president of information services at J. M. Smucker, said the company expects to reap annual savings

of \$10 million once Oracle CPG is in place at all six of its product divisions. And he added that the project, which is budgeted to cost more than \$30 million, is on schedule.

But the phased nature of the rollout is partly the result of the amount of work needed to connect Oracle CPG to the mainframe systems that J. M. Smucker uses now, Jursa said. "We're reaching the milestones we wanted to reach," Jursa said. "It's just a lot of work." And until Version 3.0 ships with the promised integration improvements, he added, Oracle CPG "is not a finished product."

**See the light.**  
**Detect R/3 problems in real time.**  
**Know where and**  
**how to fix them, instantly!**

### Introducing OptiTrak, the first component of Energizer® PME for R/3. Take the guesswork out of R/3 problem diagnosis and resolution.

You've chosen SAP R/3 to power your business. But its energy and productivity depends on how well you manage its performance and how fast you can resolve problems.

Have thousands of performance data available within R/3 can be overwhelming. Much is only retained on a daily or hourly basis. It is often not granular enough for real time use after the fact problem determination and the impact of changes is difficult to assess. Identifying which system components affect response time can be a mystery. But, finally, there's a way to use valuable time and eliminate guesswork.



It is OptiTrak, a component of OptiSystem's Energizer PME (Performance Management Enhancement) for R/3. OptiTrak detects, alerts and diagnoses problems in real time. It sends immediate alerts, highlighting problem areas and provides the information needed to correct them as they happen.

More information indicating problems in SAP, the operating system and the database is immediately available along with the "root cause" transactions associated with these alerts. OptiTrak also provides full root cause analysis to prevent

future problems. And OptiTrak delivers comprehensive reports and graphs that enable users to correlate R/3, database, and operating system components with R/3 response time and problems, allowing the effects of changes to be easily identified.

More information is based on internal processing and appears on a single OptiTrak summary screen per interval. Access to data about other R/3 systems is also available, allowing a single point control for multiple R/3 systems.

Call 888-434-3008

Like all Energizer PME for R/3 components, OptiTrak resolves within R/3 and uses standard R/3 programming features and R/3 data collection routines. This makes it simple to install, easy and familiar to use and its overhead is less than 1%.

OptiTrak works on all platforms that support R/3 and is designed for the full range of R/3 users, from the smallest company to the largest, worldwide enterprise. Find out today how OptiTrak and Energizer PME for R/3 from OptiSystem can energize your SAP R/3 investment.



OptiSystems

©1999 OptiSystem, Inc. 200, Oracle is a Plant, Englewood Cliffs, New Jersey 07632. Web: www.optisystems.com  
 Energizer PME for R/3 is a registered trademark of OptiSystem, Inc. and R/3 is a registered trademark of SAP AG. All other trademarks are the property of their respective owners.

#### Development road map for Oracle's CPG application bundle

version 2.4

Due: Next spring

**Key features:** New functionality for vendor-managed inventory and order promising

version 3.0

Due: Summer of 2000

**Key features:** Hub-and-spoke integration layer and common application programming interfaces

Oracle and the other vendors that supply software for the bundle currently have to go deep into the internals of the applications and integrate them on a one-to-one basis. The same goes for J. M. Smucker and other users that are tying Oracle CPG to existing systems, said Jeff Weder, a senior product management director at Oracle.

Version 3.0 will replace the one-to-one links with an integration hub that Oracle CPG and user applications can hook in to via simplified APIs, Weder said.

The initial release of Oracle CPG in early 1997 "way preceded the development of it as a physical package" of tightly integrated software, said David Caruso, an analyst at AMR Research Inc. in Boston. And users have been struggling to get off the ground with the bundle, Caruso added.

Oracle put together its SWAT team after users on a customer advisory council said they needed "an all-out push" to go live with Oracle CPG before the year 2000 bell toll. Weder said. At least nine companies, including cereal maker Kellogg Co. in Battle Creek, Mich., have started using various pieces of the package since early fall, he added.

Tri Valley Growers, a San Ramon, Calif., farming cooperative that grows and cans tomatoes and other fruits, has installed several of the Oracle CPG packages. But the applications aren't being used in an integrated way yet, said Jim Davis, the cooperative's project manager.

And a full rollout of Oracle CPG is on hold because the cooperative's management reversed a decision to change the way it processes orders to fit the package, Davis said. He added that getting the software modified would cost about \$1 million — a bill Tri Valley Growers isn't sure it wants to foot. □

# Introducing the Enterprise Modeling Dream Team.

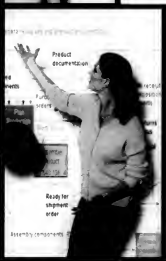
PLATINUM

**ERwin**  
data modeling

**Paradigm Plus**  
component modeling



**BPwin**  
business process modeling



**ERwin, Paradigm Plus, BPwin.**  
**Three modeling all-stars now**  
**together in the PLATINUM**  
**Enterprise Modeling Suite.**

Business processes. Data.  
Components. Your business depends  
on them. They need to work together.  
And now, your enterprise can unite  
them and gain the breakthrough  
productivity of the world's most  
trusted modeling tools.

The PLATINUM  
Enterprise Modeling



Suite is the first to integrate all the real  
world pieces of enterprise modeling.  
Now you can build business process,  
data and object models, synchronizing  
your databases and applications.

You can integrate business process  
and object models with existing ERwin  
data models. Take advantage of UML.  
And develop and maintain high-quality  
databases and applications much faster  
and easier than ever before.

**Visit our Enterprise Modeling**  
**Resource Center today at**

[www.platinum.com/dreamteam](http://www.platinum.com/dreamteam).

Visit today, or request an information  
kit by calling 1-800-78-ERWIN.

**PLATINUM**  
TECHNOLOGY

## Real-time chat seeks business role

By Roberto Fianaro

VENDORS ARE forging ahead with real-time chat initiatives, even though some users are indifferent to the technology.

David Sheehan, vice president of information systems at Atlas Copco Wagner Mining in Portland, Ore., makers of underground mining equipment, said he is "underwhelmed" by the use of instant messaging technology in business. "I can't see how we'd use it. Regular E-mail is instantaneous enough," he said.

But user hesitancy hasn't stopped the following initiatives:

- At Lotusphere '99 this month, Lotus Development Corp. will launch its revamped Notes 5.0 E-mail client bundled with its Sametime family of real-time communication products. The

Sametime products are in public beta testing and were slated to ship with Notes 5.0 by year's end. Pricing hasn't been set.

The software features one-click access and "buddy lists" — similar to AmericaOnline Inc.'s Instant Messenger software — and may be used alone or with Lotus Notes and Domino 4.6 and higher.

- More than 30 vendors, including Lotus and Microsoft Corp., are working on a standard that will let different chat clients communicate. They formed an Instant Messaging and Presence Protocol working group at last month's Internet Engineering Task Force meeting.

- AT&T WorldNet Service last month said it will offer an instant messaging service for its 1.4 million subscribers. The technology is based on PowerWorld chat software from Tribal Voice in Scotts Valley, Calif.

- StarMedia Network last month said it will launch a bilingual instant messaging client called StarMedia Express that supports characters for Spanish and Portuguese. □

## NT virus threat targets networks

CONTINUED FROM PAGE 1

crypts random text and hypertext files, making the files unusable. The virus file is named IE403R.SYS.

"It's new because this is the first [exploitation] of NT's trust mechanism," said Adam Shostack, director of technology at

Netect Inc., a security software company. "It will likely not be the last."

Although Unix systems aren't damaged by the virus, they can become "carriers" and help spread the virus elsewhere. Other Windows operating sys-

tems can host infected files but won't become a base for further contamination, according to Network Associates.

### WEB-SITE INFO

Network Associates has posted information about the virus, detection and cleaning of files on its Web site ([www.nai.com](http://www.nai.com)). Other vendors are also working on detection and cures as well as offering advice on how to prevent the virus from spreading.

An MCI spokesman said the virus was detected and contained relatively quickly, with no impact on customers or external operations.

The virus used its own encryption algorithm, which Network Associates experts were able to decode, allowing the recovery of damaged files.

In a statement, Microsoft Corp. stressed that the virus "does not exploit any security vulnerabilities in the Windows

### How the Remote Explorer virus works

- "Steals" NT domain administrator security privileges
- Checks across network for processes running with administrator privileges
- Installs itself in NT Driver directory as IE403R.SYS and also uses an associated dynamic link library
- Infects and compresses program files, randomly encrypts text and HTML files
- Stays memory-resident, requiring infected systems to be shut down
- Includes a timer to be most active during evenings and weekends, when administrators are less likely to be on duty

Source: Network Associates Inc., Santa Clara, Calif.

# TURN Oracle8<sup>®</sup> now available



NT operating system" and noted that normal security precautions can reduce the threat of infection.

#### REAL WORLD

"It's an interesting examination of how security works in the real world," Shostack said. Microsoft urges users to log on as an administrator only when necessary.

However, Shostack said that's often inconvenient because users have to close down all their processes and log in again each time they want to switch.

With Unix, administrators can run multiple windows, only one of which has higher privileges. The command that allows that, though, has itself become a vulnerability exploited by hackers in the past.

Shostack said last month's small outbreak is no cause for panic. But Larry Dietz, security analyst at Current Analysis Inc. in Sterling, Va., said hackers using such viruses are likely to seek "high-payoff" targets with large networks. "If you're a Fortune 500 company, you should be concerned," he said. □

## Knowledge 'czars' fall from grace

CONTINUED FROM PAGE 1

of knowledge sharing happens within business units, "So having a CIO send out the wrong message," said Delphi President Tom Koulopoulos.

Instead, Koulopoulos said, he sees many companies creating a team that helps each business unit understand the benefits of sharing knowledge. Spreading the responsibility for knowledge management also combats the cultural barriers involved in getting people to share information, he said.

"It's too difficult to start [knowledge management] at the enterprise level," said Jan Sciles, vice president for Internet implementation strategy at AT&T Corp. in Bedminster, N.J. The company began its knowledge management efforts in its customer care department and has since rolled out similar applications. "I don't think we'll ever have a CIO," Sciles said.

Similarly, The Mutual Group, an insurance holding company

in Waterloo, Ontario, has a vice president who oversees the knowledge management team, two knowledge architects and more than 20 team members from IT and the business units.

This organization works because "there is a tendency for the [knowledge management] effort to lose momentum when we get into the trenches," said Betty Lewis-Chan (betty.lewischan@themutualgroup.com), a Mutual Group knowledge architect.

It's not so much that people don't want to share information, though there is some of that, she said. The resistance comes from the fact that "people are already so busy," she said. Sharing knowledge may mean changing the way they work or adding an extra step to the process to enter some data into a corporate repository or publish it to a Web site.

Because workers are already strapped for time, the knowl-

edge management team at Mutual Group sells them on the idea that the knowledge management effort will save them time. "It may mean that they can spend less time looking for information or read fewer E-mails, but the benefit is efficiency," Lewis-Chan said.

Participants in the Delphi study also said that, for many companies, knowledge management positions were seen as an interim step designed to bring knowledge management to critical mass — essentially a statement of corporate priorities.

Sharon Ortel, director of intellectual asset management at Dow Chemical Co. in Midland, Mich., said that over time, knowledge management will become part of the corporate culture. "It's kind of like safety was years ago," Ortel said. "It used to be that you had a safety person in every department, but now safety is expected and is a condition of employment." □

#### Knowledge management gains momentum



Base: 500 IT professionals at large U.S. companies

Source: The Delphi Group Inc., Boston

## pre-installed on Dell® PowerEdge® Servers!

Things just got a whole lot easier.

Dell, powered by Intel® Pentium® II Xeon® processors, is now pre-installing Oracle® on their PowerEdge servers worldwide thereby providing a turn-key enterprise solution.

The advantages are significant: time and cost savings by having Oracle® pre-installed; a truly customized system pre-configured to your needs\*; the system confidence and proven reliability from pre-testing and platform validation; convenience and accountability; one call to Dell to trouble-shoot installation and configuration; and the assurance that Dell's close relationship with Oracle will help to deliver the latest releases of Oracle®.

Now the Oracle Diagnostic Pack is included to make your job simpler. Working smart has never been so easy. So, no more beating around the bush. *Be Direct with Dell.*

For information visit the Dell Web site: <http://www.dell.com/08> or call Dell at 800/626-9534 or call Oracle at 800/ORACLE-1 x19459.



intel

ORACLE®  
Enabling the Information Age™

BE DIRECT™ **DELL**  
www.dell.com

\*To help you select the right configuration for all your server needs, Oracle System Sizer 3.0 for Dell is available for download at no cost from our Web site [www.dell.com/08sizer](http://www.dell.com/08sizer). Using actual tested configurations, the Oracle System Sizer recommends a Dell system configuration appropriately matched to customer database requirements. This includes the CPU's amount of memory, hard drive capacity and other parameters.

Intel, the Intel Inside logo and Pentium are registered trademarks and Pentium II Xeon is a trademark of Intel Corporation. Oracle, the Oracle logo and Oracle® are registered trademarks of Oracle Corporation. Dell, the Dell logo and PowerEdge are registered trademarks of Dell Corporation. ©1998 Dell Computer Corporation. All rights reserved.

## The Top 10 IT Stories of 1998

## Microsoft antitrust trial grabs IT spotlight

## U.S. vs. Microsoft.

October saw the start of the historic Microsoft Corp. antitrust trial, a battle that will rage on — what with the expected appeals and appeals of appeals — until the middle of 2000, legal experts say.

Both sides have the weapons needed to endure teams of lawyers, lots of money and a tenacious belief that they are in the right.

The Department of Justice accuses Microsoft of abusing its monopoly power in PC operating systems to squeeze business partners into unfavorable contracts and to squash rivals such as Netscape Communications Corp.

Microsoft — testimony has raised basic questions that affect us all. What's a product? What's a feature? What's an operating system?

The trial for which Judge Thomas Penfield Jackson originally cleared two months has now lasted almost three. It isn't expected to wrap up until late February at the earliest.

Said one antitrust professor tracking the case, "So much for Jackson's optimism."

## Y2K becomes a mainstream concern.

In 1998, the year 2000 problem emerged from techno-obscure to become headline-grabbing news in USA Today and the subject of congressional hearings. Even 60 Minutes ran a segment that included a programmer/survivalist who has set up a mountain hideaway with its own sources of power and water in anticipation of widespread outages and rioting.

Word began to spread that it wasn't just a mainframe problem. Issues began to sprout with PCs and embedded chips in process controls, elevators, pacemakers and other date-sensitive devices.

The Securities and Exchange Commission forced public companies to disclose their project costs in quarterly

financial statements. General Motors Corp. and The Chase Manhattan Bank Corp., for example, predicted that they will spend \$250 million or more to fix the problem. Regulators even punished a handful of banks and brokers that failed to comply with their requirements.

President Clinton got into the act by establishing a White House council on the year 2000. He also signed a bill limiting liability for sharing information about the millennium bug, although critics said it was too little, too late.

And the clock keeps ticking.

## AOL buys Netscape.

Consumer-oriented America Online Inc.'s \$4.2 billion stock deal for Netscape raised more than a few questions among corporate users about the future of Netscape's business-oriented software.

A side deal with Sun softened

Sun's products — particularly those lines in which they compete — remains an unresolved issue.

## The IT labor crunch.

Just two weeks into 1998, the Information Technology Association of America unleashed a report that put the number of IT job vacancies at 146,000. By March, critics were picking holes in the report, saying the trade group had greatly overstated the problem.

Either way, the lack of skilled IT workers was a common complaint among IT managers in 1998. "There are clearly job vacancies out there," said Howard Rubin, chairman of the computer science department at Hunter College in New York. "But that doesn't mean there aren't enough people."

Still, first college graduates holding degrees in computer science commanded, on average, more than \$40,000 per year to start, and companies struggled to hold on to existing talent with cash bonuses and other perks.

Meanwhile, high-tech companies pressured Congress to increase the number of visas granted to highly skilled foreign workers to fill some of those job vacancies.

## The Internet matures as a media, shopping and stock-trading channel.

No, not everyone has forsaken the local mall for Web shopping or dropped NBC for MSNBC.com. But the rise of the Net was nevertheless dramatic.

Web demographics broadened. Women are now almost as likely as men to be online. Electronic retailing emerged everywhere, with expensive TV ads airing and Web addresses plastered everywhere, from cata-



When Kenneth Starr released his report, the nation crowded onto the Web for details.

logs to billboards. Forrester Research Inc. in Cambridge, Mass., predicted that Web stores would ring up \$3.5 billion in online sales by the close of '98. Almost every major real-world retailer with a serious Web presence says the Internet

## 1998 milestones

Birth: Windows 98; Apple's iMac.

Anniversaries: The mouse turned 30. The laser turned 40. The transistor turned 50.

Deaths: Internet pioneer Jon Postel; the Apple Newton; Eytz magazine.

Gilts: AT&T's frame-relay network was disrupted for almost 24 hours in April. Millions of papers were knocked out by a wayward satellite in May. Hong Kong's new airport had computer snafus in July.

## Other milestones

The Federal Trade Commission filed antitrust charges against Intel in June.

Computer Sciences Corp. fended off a hostile takeover attempt by Computer Associates International.

Multinational companies geared up for Europe's single currency, the euro.



William Neuhom, Microsoft's top lawyer, is using the "everybody does it" defense.

Economists, computer experts and executives from Microsoft competitors — IBM, Sun Microsystems Inc. and Netscape, to name a few — have testified so far.

Microsoft, although it won't make its case in court until mid-January, has said it doesn't have monopoly power because, in part, there's no narrow market for PC operating systems.

Overall, Microsoft's defense is, in essence: "We've done nothing wrong, and anyway, everyone else is doing it."

Although the case hasn't provided many answers yet — they won't come until the judge's de-



# The Top 10 IT Stories of 1998

is now the fastest-growing piece of its business.

Online trading also soared: Charles Schwab & Co. alone has more than a million active Web

release of the much-delayed operating system.

Because Windows 95 shipped in 1995, and Windows 98 shipped in 1998, some industry watchers said they find it hard to believe Windows 2000 will arrive in 1999, as Microsoft executives have insisted.

But no matter: Analysts say that even when Windows 2000 does ship in various pieces, most organizations are likely to wait a year to actually implement it.

## PC prices continue to plunge.

7 PC makers broke below the \$1,000 price barrier in the midst of outright sales warfare.

And while the sub-\$1,000 PC didn't become anything close to a staple in corporations, companies found they could take advantage of lower prices and a cutthroat market to forge better deals with top makers such as Compaq Computer Corp., Dell Computer Corp. and IBM.

So, will we soon see a \$499 PC in corporate America? No, said Steve Klemm, an analyst at Stamford, Conn.-based Meta Group Inc. He predicted that manufacturing costs will eventually put a halt to the price plunge.

## Congress enacts Internet policies.

8 Before turning to impeachment, the U.S. Congress gave considerable attention to legislation affecting the Internet. It passed the Internet Tax Freedom Act, creating up to a three-year moratorium on new Internet taxes. The tax measure establishes an Advisory Commission on Electronic Commerce with a mandate to

report back to Congress in two years on how to address the thorny issue of state and local taxation of electronic commerce.

Congress also passed the Children's Online Privacy Protection Act.

## Compaq buys Digital Equipment Corp.

9 Digital's 41-year history of independence came to an end after PC maker Compaq stunned the industry with a \$9.6 billion bid for the venerable midrange systems



Digital's 41-year history of independence ended with Compaq's January purchase

In March, the judge presiding over the lawsuit forced Microsoft to strip the official Java logo from its products. In November, he ordered Microsoft to

rewrite parts of its Java products — the stand-alone developer tools and the versions of Java that come with Windows and its Internet Explorer browser that must be done by mid-February, U.S. District Court Judge Ronald Whyte said.

More important, however, Whyte's ruling also suggested that Sun is likely to prevail in the Java case as a whole.

Whyte's rulings so far probably won't affect developers much anyway, said Ron Rappaport, an analyst at Zena Research Inc. in Redwood City, Calif.

"The reality is, if you're using Microsoft's version of Java, you've already decided which environment you're going to work in — Windows," Rappaport said.

At press time, Microsoft had asked Whyte for an extra two months for product compliance and to clarify whether Microsoft could ship "independently developed" Java-based products that didn't meet Sun's specifications.

Computerworld staff members Barb Cole-Gomolski, Matt Hamblin, Thomas Hoffman, April Jacobs, Sharon Macklin, Kim S. Nash and Carol Slaw contributed to this report.

accounts, with \$145 billion in assets.

And when Kenneth Starr's report was released, the nation first crowded onto the Web for details — no longer willing to wait for the next day's newspaper. That day, Sept. 11, remains the busiest ever for CNN's Web site, with 34 million page views served up.

"We consider the medium more and more mass, more and more part of daily life," said Mary Ann Packo, president of Media Metrix Inc. in New York, which measures consumer habits on the Net.

## Windows NT 5.0: More delays and a new name.

6 Microsoft's decision to rename Windows NT as Windows 2000 had some corporate users figuring they will have to wait even longer for the final

version last January.

Compaq's goal was to enter the big leagues of the computer industry, exploit Digital's IT services business and reach deeper into corporate accounts.

Now it's working to reassure Digital customers that it won't abandon technologies such as OpenVMS, Digital Unix and the Alpha processor line.

comply with Sun's specifications while the parties waited for a 1999 trial.

That was a big blow to Microsoft for two reasons: It means the software giant must

## The Microsoft/Sun fight over Java.

10 Sun sued Microsoft for alleged contract breaches related to Java in late 1997, and users began to feel the impact in 1998.

The whole thing started because Microsoft modified Java to make it run better on its Windows operating system, thus undermining the cross-platform appeal of the programming language.

Sun Microsystems CEO Scott McNeary locked horns with Microsoft over the future of Java



## Internet stocks: Some fly, some don't

COMPANY	2008 HIGH	2008 LOW
Amazon.com	59 1/2	318 3/4
EBay	47 3/4 (Sept. 10)	296 3/4
Yahoo	66 1/4	247 1/4
GeoCities	37 3/4 (Aug. 10)	39 3/4
CityWeb	67 (Nov. 12)	42 1/2
Ticketmaster/CitySearch	43 1/4 (Dec. 4)	45 3/4
TheGlobe.com	40 1/4 (Nov. 17)	36 1/2

\*Dates are for IPOs

## OPINION

## Leap (of faith) year

I try to be as upbeat as possible as I look forward into such New Year. But it's hard to feel much optimism for the industry's 1999 outlook. After two years of rapid, exhilarating change, I expect we're due for a breather.

The major cause, of course, is you-know-what. In 53 Saturdays, we will know if the year 2000 problem is a catastrophe, an overhyped boondoggle or something in between. No matter what the outcome, this will be a year of great anxiety and posterior-covering in corporate IT. And as a result of millennia nervousness, a lot of other decisions will be put on hold.

The biggest one may be the migration to Windows 2000. The new operating system is supposed to be the big technology event of 1999. But frankly, I'm dubious that it will even ship this year. And it really doesn't matter whether it does or not. In a year 2000-

crized corporate information technology world, few big systems upgrades will be undertaken, anyway. Think about it: Do you want to be the CIO who has to tell the boss that your systems failed because

you were busy upgrading Windows instead of testing your applications?

Then there's the Internet. As Webmania enters year No. 4, consolidation is inevitable. Amazon.com has a great franchise, but the company isn't worth four times as much as Borders and Barnes & Noble combined. The inevitable decline in Internet stocks will send investors scrambling for the exits — and with them, the capital that funds new ideas. The big will get bigger, and many of the small will go away.

Consolidation is boring. It gives lawyers and accountants dominion over technologists and depresses innovation. On the upside, it also stabilizes markets and creates new platforms for growth.

Finally, there's one prediction for 1999 I can make with great assurance. It may be a time of big changes at Computerworld. Look next week for the debut of a more streamlined, easier-to-navigate newspaper that groups our stories into news, business and technology categories. We look forward to hearing from you about our new design, so don't be shy. In the meantime, Happy New Year to all!



Paul Gillin, editor in chief  
Internet: paul\_gillin@cw.com

HEY, KID. I THINK THEY  
HANDLED YOU  
THE WRONG  
NUMBER.

NOT REALLY. THIS  
IS THE NUMBER  
OF HOURS I HAVE  
TO BECOME  
YEAR 2000-  
COMPLIANT.



## LETTERS

## Sorry, guys: Java is more than a language

**F**RANK HAYES is dead wrong ("Kicking the Java habit," CW, Nov. 23). And regardless of what he says, it's pretty obvious that Bill Gates knows it.

He may have said that "Java is just a language," but I believe he also was quoted as saying, "Java scares the hell out of me."

If Microsoft prevailed in the recent court decision, that might have been true. Visual J++ was designed in just that philosophy. But Java is not just a language. It is a language supported by a standardized set of classes, providing the closest thing yet to the software Holy Grail of reusable code.

For productive real-world GUI programming, you need to buy in to a heavyweight proprietary

package like the Microsoft Foundation Classes.

Java, on the other hand, is a standard, right up to the level of the windowing system itself. While AWT may hardly be "heavy duty," at least it's the first step in that direction. If I made my living selling proprietary windowing operating systems, I'd be scared too. Not even Smalltalk offered this level

of consistency.

"Write once, run anywhere" has proven an elusive goal, at least so far. But perhaps more important is its benefit in training: Learn once, use anywhere.

Tim Holloway  
ALITEI Corp.  
Jacksonville, Fla.  
mhsc@earthlink.net

Java is a standard, right up to the level of the windowing system itself.

## Skilled project management can put tools to good use

**I**CAN ONLY ASSURE that Mr. Keen ("Let's put project management out of its misery," CW, Dec. 7) has never worked on a project with an experienced project manager. Any skillful project manager can tell you that integration is one of the key factors in a project's success.

In addition to integration, another primary responsibility of the project manager is to obtain commitment, coordination and relationships among stakeholders. Although I agree that tools, particularly the up-and-coming Web-based tools, can assist in integrating projects, there are no magic bullets. Without a project manager's skills, no tool by itself can make a project successful.

Let's not get rid of project management, but let's make sure we have skilled project management projects using a good methodology. In the end, it will deliver projects on time and within budget while meeting stakeholder expectations.

Patricia Boyce  
Scottsdale Insurance Co.  
Scottsdale, Ariz.  
boycep@scottsdaleins.com

## His verdict? Government lawyers can't be trusted

**G**ALEN GRUMAN's column ("Bill Gates and the end of innocence," CW, Nov. 30) reveals mainly his naivete regarding modern American jurisprudence. A government prosecutor may pursue a high-profile case to further his personal ambitions or inflate his own ego, at least as much as he might from a genuine belief that any law has been violated. It's a little wonder that a recent survey found that 75% of law partners and 57% of judges believe the government cannot be trusted "to do the right thing."

Government lawyers can commence an action based on slightly more than a scintilla of evidence of

wrongdoing. They (ab)use the discovery process to gain tactical advantage by distracting employees and senior management from running the business, harassing the company's vendors and suppliers, and forcing the company to incur significant legal expenses.

Our society's landscape is strewn with lives broken and businesses destroyed by publicity-hungry prosecutors who are permitted to make messes but have no responsibility for cleaning them up, even though their victims ultimately are completely vindicated.

David C. Fisher  
Chappaqua, N.Y.  
dfisher@csa.com

Computerworld welcomes comments from its readers. Letters shouldn't exceed 350 words and should be addressed to MaryJan Johnson, Executive Editor, Computerworld, PO Box 917, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.



# Doomsday 2000: What's your personal strategy?

John Gantz

**N**ew Year's Eve 1999 is less than a year away. The newspapers already are reporting that there's likely to be a champagne shortage — stock up now or you'll be drinking Asti Spumante — and hotel rooms in Times Square are booked.

In a recent *Prairie Home Companion*, the folksy variety show from fictional Lake Wobegon, Minn., storyteller Garrison Keillor had one of his characters building a year 2000 fallout shelter. Last weekend, I found out that a friend of mine, at the urging of his programmer son-in-law, bought a generator of industrial strength to handle year 2000 power outages.

Sheesh. And all I was thinking of doing was taking a few weeks' worth of cash out of the ATM sometime in August or September to keep around in case there's a run on the banks that last week.

You know the doomsday scenario, don't you? While most of the office sys-

tems we deal with — stock exchanges, bank computers, manufacturing systems

**Any chance you get, blame year 2000 on the greedy corporate managers of the '60s and '70s.**

— will be year 2000-compliant, lots of embedded systems won't. It's not that there are data fields in the microprocessors that throw switches remotely in the electrical grid, control valves in heating and water systems or manage traffic lights, but that their maintenance logs will read that it's been 100 years since anyone serviced the switch/servo/rotator/valve/motor/engine/

fan. To be safe, the systems will shut down, creating power outages, chaos in distribution, looting and anarchy.

Personally, I'm not worried about year 2000. Of course, the dinosaurs weren't worried about asteroids hitting the Earth, either. All I know is that, in more and more social settings, I find average citizens expressing views on what once was primarily an IT professional's domain.

This, folks, isn't good. The IT profession will be front and center for the entire year of 1999 in a way it never has been before. Every kind of nut, charlatan and headline seeker — myself included — will be making pronouncements about our previously obscure profession.

If a million VCRs and microwave ovens start blinking at midnight Dec. 31, if a run on the banks causes a financial crisis in Zurich or if civilization drops collapse, programmers and systems analysts will be blamed. If Jan. 1, 2000, comes and goes without incident, we will be blamed as alarmists, and our bosses will wonder whether we needed to spend those billions we're now spending fixing this so-called problem.

As the year goes on, we each are personally going to be called on more and more to be year 2000 gurus for our friends and colleagues. For that we'll need to develop our own personal strategy for dealing with year 2000 and for communicating our recommendations. Here are mine:

**One.** Any chance you get, blame year 2000 on the greedy corporate managers of the 1960s and 1970s who made IT professionals cut corners. Preserve the image of the profession.

**Two.** Tell half your friends that everyone is overestimating the impact of year 2000 and the other half that everyone is underestimating it. You still will have some friends left on New Year's Day.

**Three.** Take a week's cash out of the bank in September, but tell people it's for bribing cab drivers at Comdex.

**Four.** Put to early for vacation the last two weeks of December.

**Five.** When you bought this year's champagne, I hope you bought next year's, too. ☐

Gantz is a senior vice president at International Data Corp., a sister company to Computerworld in Framingham, Mass. His E-mail address is jgantz@idcresearch.com.

## 1999: The year of living in the Y2K spotlight

Allan E. Alter

**T**ime magazine named "The Computer" its 1982 Man of the Year. For 1999, I think it will be "The Computer Professional."

In past years, our machines have outshone us. Not this one year. The spotlight will seek us out as we work overtime to keep the electronic brains of the Information Age from dying of millennium meningitis.

And what a strange, warped spotlight it will be:

• Hollywood will portray us as hapless hacks or heroic saviors in the sure-to-come year 2000 catastrophe films.

• Lawyers will scrutinize our every word and move as they get ready to spring their lawsuits.

• Statesmen, politicians, civil servants and relief workers will call us into hearings and meetings to get our learned opinions on the year 2000 problem's scope and dangers.

• Reporters, both Pulitzer Prize winners and tabloid hacks, will stick their microphones in front of our schoozies and ask us, "Just how bad will it be?"

• Some of us will get special scrutiny: the military, utilities (especially electric

companies, but also gas, water and sewer), banks, airlines and key federal agencies such as the Federal Aviation Administration and Internal Revenue Service.

• Our neighbors, family and friends will run to us for advice. I bet you spent part of your Thanksgiving and Christmas dinners fielding questions from nervous parents, children and relatives. I did.

As we get closer to the date, the spotlight will shine hotter. When spymos seize up and fail, when pessimists grow more pessimistic, when Wall Street suffers a bad day next December, we who are fixing the problem will get the kind of attention usually reserved for the Mark McGwire and Monica Lewinsky.

I don't know if we're going to be the heroes or goats of 1999. But I do know that if we want to be heroes, the IT profession must rise to the occasion. We must accept our inevitable public

role. What the world wants from us is level-headed, trustworthy guidance in a scary time. We have to deliver it. No, that isn't quite right. We have to excel at it.

I would like to see prominent associations of IT executives and year 2000 project managers — such as the Society for Information Management, the Conference Board, the Information Management Forum and the Research Board — speak out on what needs to be done and what we can stop worrying about. Most of them have research arms; members should kick in the money, needed so they can track year 2000 progress.

If those groups won't do it, then year 2000 project managers should

form an ad hoc task force and do it.

Year 2000 chiefs at industry-leading companies such as Wal-Mart Stores, Procter & Gamble and General Motors ought to speak out on their industry's year 2000 preparations, coping, warning or panicking and reassuring, as called for. They can have an enormous influence on their suppliers and customers.

They should follow the lead of the National Retail Federation, which deserves credit for investigating year 2000 issues that affect retailers and publicizing their findings.

And, as Computerworld columnist Ed Youdon and Peter G. W. Kern have written, we can help our own communities get ready.

I'm not saying you should become a publicity seeker. I'm saying publicity is going to seek you out. Like it or not, this is our year in the spotlight. We can shrivel under its glare like a bug under a magnifying lens, or we can show what the people in this admirable profession can do. ☐

Alter is Computerworld's department editor, Managing. His E-mail address is allan.alter@computerworld.com.

**What the world wants from IT leaders is level-headed, trustworthy guidance in a scary time.**



With a proven track record of reliability, HP's servers offer the performance and scalability you need to support your company's growth. With a proven track record of reliability, HP's servers offer the performance and scalability you need to support your company's growth.



# Get ready to let your vendors do the dirty work

David Moschella

**T**hey were only minor press events, but Microsoft Corp.'s cooperation with Qwest Communications International Inc. and Yahoo Inc.'s use of Motorola Inc.'s Starfish technology are representative of a trend that began in 1998 but will grow ever-more powerful in 1999 and beyond.

In case you missed the actual announcements, Microsoft and Qwest will work together to use the latter's high-speed communica-

tions network to deliver business applications and online software support. Yahoo will use Starfish's data synchronization technology on its Web site to help its coordinate calendar and other information across PCs, laptops and PDAs.

You don't have to get excited about either initiative to see that they are symptoms of a larger trend. Increasingly both new and established companies are trying to use the Web to replace packaged



**SAP, for example, will have to make R/3 work. Now that's a revolution.**

software with online services, a trend I call the "seamless revolution." That's "seam" as in services and "seam" as in software.

The idea is simple. Instead of selling a packaged software product, a vendor develops the software for its Web site, where it is available to any customer with an Internet connection. The vendor then takes care of all upgrades and maintenance.

Of course this trend is inseparable from a much broader concept. Ever since

the vision of a networked online IT industry began to take hold, many have speculated that it was only a matter of time until processing power, storage and applications would reside mostly out on the network. After all, if you have enough bandwidth, what difference does it make whether your disk drives are down the hall or across the continent?

My own view is that our fundamental computing paradigms are usually determined by the need to exploit abundant resources and optimize scarce ones. During the mainframe era, machines were expensive and computer personnel relatively cheap, so time sharing resulted. In the PC era, processing power was abundant and bandwidth scarce, so general-purpose, off-line machines were developed.

In tomorrow's network-centric era, it will be bandwidth that is bountiful and application developers who will be scarce. Consequently, sharing software expertise will be the most cost-effective way for companies to create virtual services of customers. Using *seamware* will be faster, cheaper and simpler than maintaining your own packages.

The implications of this shift will be as profound as the shift away from

timesharing and toward PCs. But like PCs, we are looking at a 10- to 15-year transition. Today, the trick is to recognize the early opportunities while preparing for the larger revolution to come.

The signs of change are all around us. Most of us already access more applications and processing power on other people's Web sites than we do on our own PCs or even our corporate systems. It's only a small, additional step to store our key files and personal productivity tools on our Web site of choice. Once our data is on the network, we can let our vendors ride the technology wave.

And if consumers go this way, can business be far behind? It's not hard to see mass corporations, especially new ones, using Web services to manage payroll, human resources, health plans and other traditional applications. Just think: The burden of service delivery will shift to the software vendor, competing services will greatly reduce software lock-in. It will be, for example, SAP AG that has to make SAP R/3 work. Now, that's a revolution. □

Moschella is an author, independent consultant and weekly columnist for Computerworld. His E-mail address is [dmoschella@earthlink.net](mailto:dmoschella@earthlink.net).

# We all love polls, so let's use them the right way

Michael Schrage

**B**eyond question, America is the most poll-obsessed society on Earth. I know that because survey after survey reveals at least 7 out of 10 polls are read by an average of 8 out of 10 people — 43% of whom claim they don't even read polls. Just kidding.

Our pathological polling practices produce and reinforce a lot of the analyses that govern IT perceptions. Not incidentally, they're ideal fodder for editorial coverage. I'm particularly intrigued by all the polls and surveys conducted by the Giga Information Groups, Meta Groups, Gartner Groups, Computerworlds and CIO magazines purporting to reveal the business priorities of the managerial digerati. So many polls to choose from, and not unlike their political counterparts, their answers often skew according to how the questions are asked.

I must confess that I find looking at the older polls rather bracing. They offer a quick and easy way of tracking how our self-proclaimed priorities shift or tumble over time.

That said, you gotta smork when you look back at many of the 1996 and 1997 polls of CIOs that not only give short shrift to the Internet but didn't even make our favorite bugaboo — year 2000 — a top-tier priority. If you really want a treat, look at a Computerworld poll of a decade ago. You will be astonished at what has and hasn't changed.

Does that mean our CIOs and tech nerds are dumb? Of course not. Do we make them lousy prognosticators? Of course. Predicting the future is a mug's game. This industry has always done a better job of in-

venting the future rather than predicting it. That said, it also reveals that the demographics and psychographics of IT management have been radically changing.

For that reason, surveys and polls inherently represent a skewed view of the marketplace. But it's interesting to learn when CIOs rank business alignment as a higher priority than Internet awareness or retaining their talent more important than on-time delivery. These efforts to take the pulse of IT offer valuable insight into why CIOs do what they do. Of course, what people say is important doesn't overlap with what they actually do. The gaps between word and deed, as well as perception and reality, are where the action really is.

For that reason, I



look at IT polls kind of like using X-rays to diagnose heart attacks or thermometers to detect tumors. They don't quite capture the key symptoms. That's why I'd like to see more polls of the IT community, but with a twist. Let's see some context. Let's treat polls and surveys as part of a battery of diagnostics instead of as an endless series of one-shots.

Whenever we see a poll of CIOs on business priorities, let's see counterpart responses from, say, the CEOs and chief financial officers or key customers. Better yet, I always love those few surveys that look at the differences between what the top dogs proclaim as their priorities and what their underlings say. What we need aren't better insights into the IT community, we need better insights into the gaps between the different IT communities and their relevant constraints. Just as we see political polls breaking our party affiliation, age and/or income, we need IT polls that highlight where priorities converge and fragment. □

Schrage is a research associate at the MIT Media Lab and author of *No More Teams!* His E-mail address is [schrage@media.mit.edu](mailto:schrage@media.mit.edu).

**Treat polls and surveys as part of a battery of diagnostics instead of as an endless series of one-shots.**

# Corporate Strategies

Case Studies • Trends • Outsourcing

## Briefs

Highest IT priorities worldwide, November 1998

- 1 Year 2000
- 2 Increasing alignment with business
- 3 Improving quality (systems and services)
- 4 Decreasing costs
- 5 Updating technology infrastructure

Base: Interviews with 426 companies worldwide

Source: Citicorp Information Corp., Arlington, Mass.

### Market watch on Web

The Nasdaq-Amex Market Group in New York has developed a Web site with The Stock Exchange of Hong Kong Ltd. (SEHK) that allows investors to track securities, mutual funds and options on their respective stock and options exchanges. The site, which is currently being beta-tested, can be accessed at [www.portstracker.nasdaq-sehk.com](http://www.portstracker.nasdaq-sehk.com). Prices posted on the site will be delayed by one hour for SEHK companies, 15 to 30 minutes for U.S. quotes and one minute for U.S. indices.

### HR contract

The city of Troy, N.Y., has hired GE Capital Information Technology Solutions and Aquilion Software Corp. in Minneapolis to implement a cloudside information system designed to handle human resources, payroll and other administrative functions. The terms of the agreement weren't disclosed.

### Crypto group forms

Several major security vendors have formed a consortium aimed at developing standards for elliptic curve cryptography. The Standards for Efficient Cryptography Group hopes to develop ways for various products based on elliptic curve encryption to easily work together in industries such as electronic banking and wireless communications.

## To find fuel, first make data flow

• Web, middleware help explorers share

By Julia King

DRILLING FOR oil and gas is an extremely risky and high-cost venture that even the biggest companies are unwilling to go alone anymore.

To reduce their risks, the industry's giants are teaming up on projects around the world that makes easy data sharing all the more critical.

Typically projects take place over several years and involve a few large oil companies plus dozens of subcontractors including drilling, companies platform fabrication, computers and often, engineering project management companies to keep the whole thing on track.

A case in point is the \$2.5 billion Sabal Offshore Energy Project. Located in the North Atlantic off the coast of Nova Scotia, Canada, the project's objective is to develop six reserves containing an estimated 84 billion cubic meters of recoverable natural gas. The project's four main partners are Mobil Oil Canada Properties Ltd., Shell Canada Ltd., Imperial Oil Resources Ltd. and Nova Scotia Resources Ltd.

The Sabal project is using a combination of Web and middleware technology to make up-to-the-minute project data avail-

able anytime, anywhere from various partners' computer systems in Houston, Calgary, Alberta, Halifax, Nova Scotia, and London. Using a Web browser, about 200 users worldwide can tap in to engineering, production and cost data plus three-dimensional geological drawings generated in the project's four major oil industry partners and seven contracting firms.

To find fuel, page 24

## MovieFone says callers predict hits

By Stewart Cook

IN 1997, MovieFone Inc. started to construct a data warehouse so that it could follow the historical calling patterns of people who phoned in to



Enter the 4-digit Phone Number Code for your favorite movie here.

MovieFone hopes to sell data to theater owners and developers

its free 800-456-7890 service.

The company wanted to make sure it had plenty of phone lines set up to cover peak calling times, and it wanted to dig into some of the data about calls. Pretty standard stuff.

But when the system went live 11 months ago, New York researchers at the New York-based firm realized that the data they were seeing was even more useful. Data from MovieFone and its sister Web site MovieLink

([www.movielink.com](http://www.movielink.com)) could help them quickly advise theater owners on how many screens a blockbuster movie should play on and even let them advise theater developers on picking hot locations.

Seem far-fetched? MovieFone covers more than 15,000 theaters in 10 cities. This year it will handle approximately 60 million calls and 100 million Web site user sessions. Each of those calls and site visits requests data about theaters and films in particular area codes, and sometimes they even conclude with a ticket sale.

"We built a warehouse because we needed to access this information dynamically and drill down into specific markets

MovieFone, page 24

## CVS pilot aims to build loyalty

By Roberta Fusaro

PHARMACY CHAIN CVS Corp. is trying to build customer loyalty and sales in three pilot markets with the help of new customer-level data warehouse software, officials said recently.

The 4,000-store retailer of prescription drugs and health and beauty aids, based in Woonsocket, R.I., is trying to identify buying patterns and do

direct mailings based on a customer's previous purchases, said Mark Robinson, relationship marketing manager at CVS, in a recent interview.

But officials refused to provide details on how the campaigns would differ from competitors' customer-loyalty campaigns.

CVS is using Prime Vantage campaign management software from Prime Response Inc.

on top of an Oracle Corp. data base and its Hewlett-Packard Co. HP-UX-based hardware.

Many retail outlets have tried similar strategies using customer-loyalty cards, said Bob Moran, an analyst at Aberdeen Group Inc. in Boston. And using data warehouses to focus the programs is becoming more common, he said.

For instance, supermarkets have had some success with customer-loyalty cards. And large companies often use data warehouses for such marketing campaigns. □

### AT A GLANCE

Who: CVS Corp., in Woonsocket, R.I.

What: Implementing a data warehouse to build and/or expand a customer-loyalty program in three test markets: Baltimore, Albany, N.Y., and Greensboro, N.C.

Goal: To enhance sales and profitability for the chain and to boost customer satisfaction.





## To find fuel, make data flow

CONTINUED FROM PAGE 21

Sable's users access all this data via an extranet from a Sunware Inc. Salvo application server, which is built a central warehouse and translator of data generated on a wide range of multi-vendor, incompatible legacy systems

belonging to various project partners.

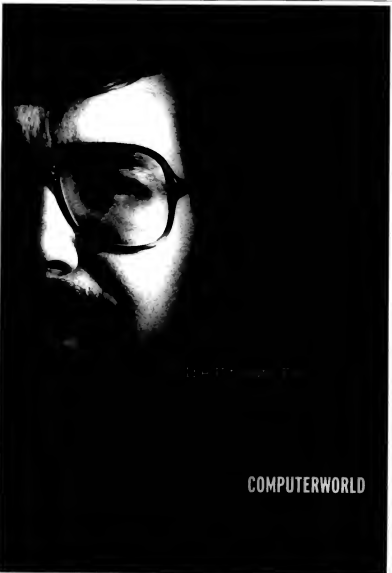
Prior to implementing the Salvo server, Aggra Montecro-Brown & Root, the engineering management company jointly in charge of managing the Sable project, used separate servers at locations

in Halifax and Houston to maintain information, updating the servers using Zip disks once per week, according to Stacey Darragh, a quality assurance manager on the project. The total cost of the extranet project was \$350,000.

"The biggest benefit is in productivity because all information is immediately available to everyone," said Hugh MacIntyre, finance and administration manager at Aggra Montecro.

Another key advantage of the extranet is that it allows Sable project workers from participating companies to continue using the technologies with which they're already proficient.

By contrast, on the \$2 billion Hibernia Offshore Project a few years ago, the same four oil industry partners opted to build a project-specific computer system which ultimately required an IT organization of 47 people to support it. □



## MovieFone

CONTINUED FROM PAGE 21

specific theaters and specific movies," said Irwin Miller, vice president of computer systems development.

The warehouse was built on a Sybase Inc. database and business intelligence tools from Business Objects S.A. It uses Sybase IQ for query acceleration.

In addition to providing information about current movies, MovieFone also sells ads in the form of audio movie previews. It uses the warehouse to demonstrate to distributors how effectively those previews turn into ticket sales. Its researchers use the data to map historical patterns and model caller behavior.

Miller said MovieFone is working out how to properly add the Web site surfer behavior data from MovieLink to the warehouse. The researchers hope to have their hands on this data in 1999.

"Retail generally is a good user of data warehousing because so much of what they do is marketing-intensive," said Mitch Kramer, an analyst at Patricia Seybold Group in Boston. Predictive marketing is a pot of gold for retailers, he said.

But Miller said his group has just begun to exploit the warehouse's potential.

"Since we know how many people are seeking information and buying tickets to particular movies, we can now provide exhibitors and distributors with accurate data the day a movie opens," Miller said. If the calling pattern fits the "blockbuster" model, MovieFone can use the data (for a fee) to help exhibitors decide how many screenings to add.

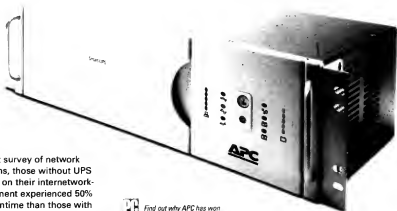
The data may also be used in the future to figure out the best location for new theaters. "If someone wanted to open an art-house theater, they could come to us and ask for a demographic breakdown by ZIP code of people who've requested art films. We can give them ticket sales by ZIP code; they can then choose where to build that new theater for the best results," Miller said.

But one industry observer wondered how much more information distributors and exhibitors need. Distributors already know the good neighborhoods, and moviemakers have extensive demographic audience data from test screenings and focus groups, said Paul Marsh, an analyst at S. G. Cowen & Co. in New York.

"It seems like every company that does [data collection] always figures they can sell the data. If I were a theater company, I don't know if I'd be interested in buying his information," Marsh said. □



# Why "rack" your brain to increase uptime? Just rack APC Smart-UPS®



In a recent survey of network installations, those without UPS protection on their internetworking equipment experienced 50% more downtime than those with protection. Think about it...

Why put power protection on your servers but forget about the equipment that connects it all together?

One 5 minute power outage on internetworking equipment, causes 10 minutes of downtime on your network, resulting in 500 users with idle applications, swamped help desks costing the company upwards of \$10,000\*, and a boss who wants an explanation.

So protect yourself before you kick yourself. Visit us today at <http://promo.apcc.com> and enter key code below.



Find out why APC has won over 130 awards for reliability and visit [www.apcc.com](http://www.apcc.com) today

#### APC Smart-UPS is manageable

- APC's Web/SNMP Management Card allows you to manage your Smart-UPS from any Web browser anywhere. For remote reboots demo our MasterSwitch™ at [www.apcc.com](http://www.apcc.com).
- APC PowerNet software provides full integration with TivoliTME/10, HP OpenView, CiscoWorks 2000, and other leading platforms.
- APC's PowerNet allows you to combine the management of Cisco and other mission critical devices in your network.



#### APC Smart-UPS lowers support calls

- Instantaneous battery back-up power means hubs, routers and switches provide continuous data flow throughout your network.

#### APC's new NetShelter™

- Offers manageable enclosure space for all your networking equipment including Compaq, Dell, HP, and IBM.



**APC**  
Legendary Reliability™

\* (InternetWeek/Contingency Planning)



**FREE APC internet networking kit:** Learn how APC can make your network more manageable  
Order now <http://promo.apcc.com> Key Code i685z or  
Call: (888) 289-APCC x7462

© 1999 APC. All trademarks are the property of their owners. SHANBIT-US

PowerFax: (800) 347-7462

E-mail: [internetworking@apcc.com](mailto:internetworking@apcc.com)

132 Farnsworth Road West Kingston, RI 02892 USA

**There's an Easier Way to Reach Your SAP Data.**



# The SAS® Data Warehousing and Decision Support Solution Is the Real Breakthrough.

You're ready to start reaping a return on your ERP investment. You're set to turn your operational data into information that supports strategic decision making. But first you need to go get the data. And you're tired of waiting for a way to get inside.

SAS software—from the world's leader in data warehousing and decision support—lets you gain immediate access to SAP AG's R/3, or any other data, right now. Together with capabilities for transforming raw data into real business intelligence—and true competitive advantage.

Visit us at [www.sas.com/erp](http://www.sas.com/erp) for more information and to request our **free guide**: Maximizing Return on Your SAP AG R/3 Investment. Or give us a call at 919-677-8200.

◆  
Fully Web enabled

◆  
Access and consolidate corporate data  
whatever its source—R/3 or other ERP systems

◆  
Turn data into profitable decisions using  
data mining, customer relationship  
management, balanced scorecard, and more

◆  
Year 2000 and Euro compliant

SAS Institute Inc. The Business of Better Decision Making.



In Canada, phone 1-800-363-6297. SAS is a registered trademark of SAS Institute Inc. Copyright © 1998 by SAS Institute Inc.



**IF YOU'RE BUILDING A DATA WAREHOUSE,  
BE SURE YOU DON'T BOX YOURSELF IN.**



**DataStage®**

Warehousing projects start out simple enough, but they never stay that way. Choose the wrong tool and you could find yourself trapped. The only way out is starting over.

With DataStage, your warehouse application never needs rebuilding. Its visual design tool lets you add data sources, targets and transformations without starting over. Modular plug-in stages let you add functionality as you need it. Best of all, reusable components cut development time dramatically. The result? A data warehouse that grows with your business.

Backed by Ardent, a top 100 software company with a global network of valued partners, DataStage helps you work smarter, not harder. Get the full story at [www.ardentsoftware.com](http://www.ardentsoftware.com) or 1-800-966-9875.

Ardent Software, Inc. 50 Washington Street, Westboro, MA 01581-0021  
Copyright© 1998 Ardent Software, Inc. All rights reserved.

**Ardent®**  
THE ART OF DATA MANAGEMENT

# Internet Commerce

Extranets • The World Wide Web • Intranets

## Briefs

### U.K. E-commerce lags

In the U.K., purchasing goods online is almost impossible for those not accustomed to it, according to a new study of major U.K. retailers' Web sites. The study, conducted by London-based TucCom Group, found that Web sites full short when tested on functionality, ease of use, security, performance, use of interactive technology and browser compatibility. In one case, researchers had trouble locating the items they wanted to buy and then encountered JavaScript errors when they tried to purchase them.

### E-commerce payments

The Next division of Barclays Bank PLC plans to develop what it says is the U.K.'s first bank-owned Internet payment system. Barclays Merchant Services will work with Repton, Va.-based CyberCash Inc. to offer payment authorization for credit-card purchases on the Internet. The service will be called EPDQ (www.epdq.co.uk).

### Mining for news

Minisearch, the Internet guide network, said it has picked Library software from L-Soft International Inc. for the administration of its 350-plus E-mail newsletters. The New York firm pushes customized information to subscribers' in-boxes via E-mail.



CNN Web site page views

Dec. 16 (when military action was launched against Iraq) 25.7 million

Sept. 11 (release of the Starr report) 34 million

1997 total More than 28

1998 total, through mid-December 4.38

Source: Cable News Network, Atlanta

## Start-up taps Web to rent DVD films

► NetFlix corresponds with customers by E-mail

By Roberto Fusaro

THE EMERGENCE of DVDs and E-mail-based customer service technologies could unlock a lucrative business model for online retailer NetFlix.com in Scotts Valley, Calif.

NetFlix.com was established a little more than a year ago to target an untapped niche in the electronic-commerce market: movie rentals.

Because of the bulk and cost of delivering VHS tapes, renting tapes over the Web wasn't a popular business option, said Jim Cook, chief technology officer and director of operations at NetFlix.com. "It wasn't worth the shipping costs for a \$4 rental," he said.

But the small, easy-to-ship format of digital video disc (DVD) makes the product a better vehicle for renting movie

titles online, officials said. The discs cost between \$20 and \$30 each to buy and between \$3 and \$5 each to rent, plus shipping and handling charges.

One disc weighs less than two ounces and costs about 55 cents to ship via the U.S. Postal Service. "We're dealing with much lighter material than VHS tape," Cook said.

The NetFlix.com service works like this: A customer searches for and orders a movie at [www.netflix.com](http://www.netflix.com), and the DVD is sent in an unmarked package along with a preaddressed, prepaid return envelope. The customer can keep the disc for seven days from the day it arrives and then return it via U.S. mail.

The company has more than 2,300 titles available for rent and offers delivery within two days coast to coast.

According to InfoTech Inc., a Woodstock, Vt.-based research



NetFlix.com's Jim Cook says the company decided to let users check order status at the Web site after analyzing E-mail queries collected by Mustang's Internet Message Center

firm, DVD players were on track to sell more than 1.2 million units worldwide in 1998, a 140% increase from the previous year. InfoTech attributes the growth to Hollywood's accep-

tance of the medium — a large catalog of films is now available on DVD — and falling PC hardware prices, which are allowing more PC manufacturers to add DVD, page 32

## News, info remain lead Web activities

► Numbers show Web shopping on the rise

By Sharon Machlis

Mary Ann Packo is president and chief operating officer of Media Metrix Inc. in New York, a company that measures consumer Web usage for clients such as major Web retailers and publishers. Media Metrix recently merged with one of its prime competitors, Relevant Knowledge, to provide a more standardized way of measuring Web usage.

CW: What major consumer trends emerged on the Internet in the past year?

PACKO: There's been a real narrowing of the gender gap. When we began measuring in



Media Metrix's Mary Ann Packo says portals with many different offerings generate a lot of traffic

a 50/50 split [between] men and women.

And when we began measuring [Web use for] news, information and entertainment, only 40% of people were going to those sites.

Now that's over 80%. ... Media and marketing are kind of merging out there. Portals are [also] offering things for sale.

CW: For people trying to sell to consumers via the Internet, what are the most important things going on?

PACKO: We're clearly seeing increased traffic to what we call shopping sites. That is our fastest-growing [category].

The book category, music category, computers, support and perhaps the auction-type category.

Media Metrix, page 32

## Snapshot

### PROFILING INTERNET USERS

	Online more than 42 months	Online less than six months	Not online
Median age (household head)	38	41	49
Median household income	\$60,000	\$52,000	\$29,000
College-educated	68%	65%	36%

Base: Survey of 120,000 North American households, including 8,600 households in-eligible; margin of error +/- 2%

Source: Forrester Research Inc., Cambridge, Mass.



DB2® Universal Database™ is at the heart of today's newest and most powerful e-business applications



**This is the database for what's in your head.** If you can think it, you can make it real today with DB2 Universal Database. Built-in Java® makes it the first database engine optimized for Web apps. New TPC-D benchmarks\* make it the price/performance leader on both Windows NT® and UNIX. Powerful middleware tools make it easy to exploit apps and data sources

\*TPC-D benchmarks simulate a real-world, complex data processing and analytical database. A large database. Published TPC-D results as of 9/9/98. Subject to change without notice. For more information see [www.software.ibm.com/db2/benchmarks](http://www.software.ibm.com/db2/benchmarks). IBM, DB2, DB2 Universal Database, WebSphere are trademarks and solutions for a single platform are trademarks of International Business Machines Corporation in the United States and/or other countries. Java and all other named trademarks and logos are trademarks of Sun Microsystems, Inc. in the United States and/or other countries. Windows NT is a trademark



anywhere and extend them to users everywhere. All with "right now" performance, from single processors to terabyte-scale clusters. The free evaluation kit and trial code alone will get you thinking. The Universal Developer's Edition, including WebSphere® Application Server, will get you building. Raise your sights. Visit [www.software.ibm.com/udl/08](http://www.software.ibm.com/udl/08).

**IBM.**

Solutions for a small planet™

© 1998 IBM Corporation. In the United States and/or other countries, UNIX is a registered trademark of the United States and/or other countries, licensed exclusively through AT&T Company Limited. SPCL and TPC are trademarks of Transaction Processing Performance Council. © 1998 IBM Corp. All rights reserved.

## DVD

CONTINUED FROM PAGE 29

DVD-ROM drives to their systems. Currently, only about 4% of households have a DVD player, but analysts expected big sales of the players this past holiday season.

Early on, NetFlix.com realized that its primary means of communication with customers would be E-mail. Since its launch, the company has been using the Enterprise Edition of Internet Message Center from Bakersfield, Calif.-based Mustang Software Inc. to route hundreds of messages per day and issue automated responses.

"It's not economically viable to have a huge phone bank. So we needed a [software] package to serve as a dispatcher," Cook said.

Besides routing E-mail, the system also provides a way to drill down and analyze questions that the company has received, he said.

**"It's not economically viable to have a huge phone bank. So we needed a [software] package to serve as a dispatcher."**

— Jim Cook

NetFlix.com

For example, Cook said, queries about order status are common. So NetFlix.com used that information to create a "Your Account" feature on the site that lets users check order status themselves. And customer service agents can be dispatched to look into larger problems such as technical problems with DVDs, Cook said.

The company hopes to integrate other systems within the E-mail customer database — including billing systems and personalized marketing programs, said Tr Smith, NetFlix.com's marketing director.

### COMPETITION

NetFlix.com's main competition comes from video retailers such as Reel.com and Blockbuster Entertainment Group. But Cook noted that those companies are selling, not renting, DVDs over the Internet.

Dave Rochlin, vice president of marketing at Reel.com, confirmed that the retailer doesn't rent DVDs but did mention that it recently launched a DVD-only section of its online storefront. The company uses standard Web forms and E-mail routing software, Rochlin said.

Reel.com briefly tried rentals over the Web but phased out the practice after the company was bought by Hollywood Entertainment Corp. "Logistically, it didn't really work," a spokesperson said. "We found it hard to turn around the product to customers. And it seems like most DVD [users] are buying, not renting." □

## Media Metrix

CONTINUED FROM PAGE 29

gory are getting dramatically increased traffic.

**CW: What are we likely to see this year?**  
**PACKO:** One thing we look at every six months is the fastest-growing sites. We'll

be doing that again after the year-end numbers. The first half of [1998] had a lot to do with community and relationships on the Web — sites like Tripod and GeoCities. Then there's the whole personalization issue.

**CW: Sites offering personalized information and content?**

**PACKO:** We've seen that trend with the portals providing more and more

ways of providing "stickiness" [enticing people to stay on a site once they have clicked in].

They started adding content, news. Now you've seen them add in these personalized features — "Yes, you can get a free home page here as well," or "Yes you can visit these areas [news and entertainment]."

**CW: What are the best strategies for**





companies trying to attract consumers to their sites?

**PACKO:** There are two distinct strategies. Appeal to the user in many different ways, or be specialized and draw a defined audience.

**CW: Which is working?**

**PACKO:** In terms of traffic, we definitely see the portals with lots of different offerings attracting really strong traf-

fic. We [also] see great repeat traffic to specialized sites. It depends on the company's business purpose for the site.

**CW: Was 1998 the year the Internet came of age, with events such as the Starr report being released on the Web?**

**PACKO:** We clearly do see traffic driven by news events. The Starr report was one of our all-time highs in terms of daily usage.

Also, things like natural disasters really drive a lot of traffic to the Web — hurricanes, tragedy, natural disasters.

**CW: Are you surprised by the pace of consumers' adoption of Web technology?**

**PACKO:** There have been very aggressive growth projections. I think it's tracking very close to the projections [analysts] have made. □

## At Pfizer Central Research, it's elemental.

Some have a mission in life. Our mission is life—enhancing it and saving it through the successful pursuit and development of best-in-class drugs. That's why our commitment to R&D is one of the strongest in the healthcare industry. More than \$2 billion strong this year alone. A commitment that's yielded—among other successes—the world's leading antihypertensive, the most advanced anti-infectives, and a revolutionary treatment for erectile dysfunction.

Of course, we realize that without highly skilled, highly motivated professionals driving the discovery process, no budget is worth bragging about. So we've created a research environment that embodies stability, embraces creativity, and fosters personal achievement. Because while success can never be guaranteed, we believe it can be built on a foundation of excellence.

Pfizer Central Research

## NEW PRODUCTS

**BROOKLYN NORTH SOFTWARE WORKS INC.** has announced Blueprint, Web site analysis and management software that can isolate and repair broken Web links.

According to the Andover, Mass. company, users can repair broken links from within the 32-bit application Blueprint can institute a global fix throughout a Web site and generate site reports that track link status as well as page and graphic sizes. A scheduler feature eases link maintenance by automatically checking multiple sites at regular intervals. The Business Edition supports up to 100,000 Web pages.

Blueprint Business Edition costs \$499.95.

Brooklyn North Software Works  
(978) 557-9700  
[www.brooklynnorth.com](http://www.brooklynnorth.com)

**ELECTRIFIER INC.** has announced Electrifier Pro, Macintosh-based software for creating compact Internet multimedia files.

According to the Chapel Hill, N.C., company, users can create fast-downloading multimedia that incorporates bit-map and vector animation, digitized audio, synthesized music, video, three-dimensional objects, virtual-reality panoramas and more than 150 special effects such as emboss, blur and fade.

Electrifier Pro integrates with other authoring tools such as Adobe Systems Inc.'s Photoshop, and it plays back using animated graphics interchange formats or Apple Computer Inc.'s QuickTime format.

The software costs \$595.

Electrifier  
(919) 968-0701  
[www.electrifier.com](http://www.electrifier.com)

**ALLEGIS CORP.** has announced Net-It Central 3.0, software for publishing desktop documents to an intranet or extranet.

According to the San Francisco company, the documents can be published using a standard Web browser and can later be viewed without plug-ins.

Net-It Central 3.0 was designed to retain a document's original appearance, whether it's a spreadsheet, report or presentation. Publishers can store information such as project name, author, department or keywords as searchable meta data written in Extensible Markup Language.

Net-It Central 3.0 costs \$9.995 per server for unlimited users.

Allegis  
(415) 551-0600  
[www.allegis.com](http://www.allegis.com)



**Stylish.** Introducing the Toshiba Portégé® Series. Precious metal doesn't get more refined than this. With a magnesium alloy casing and sculpted contours, it's the most ultra-compact powerhouse Toshiba has ever built. Because success isn't just how you carry yourself. It's also what you carry.



**Ultraportable.** It's one inch thin. And 4 lbs. light. Usability and portability have never been more perfectly matched. With its built-in K56flex™ upgradeable modem with DSVD data/fax/voice and full-size keyboard with AccuPoint™, Portégé is designed for serious mobility. Not unlike yourself.



The cutting edge.  
Forged from an alloy of magnesium  
and imagination.



**Performance.** Powered by the latest Intel Pentium® II processor 300MHz, Portégé has a huge 4.3 billion byte hard drive, 32MB high-speed Synchronous DRAM, Windows® 95 or optional Windows NT™. Even the new NeoMagic™ Graphics Controller. All brought to vivid life on an impressive 12.1" display.



**Expansion.** The optional CD Network Dock delivers full port replication with a 10/100 BaseT Ethernet, 240x CD-ROM, floppy disk drive and speaker with microphone. When docked, Portégé does the job of a desktop and is still thinner and lighter than most notebooks. Call us at 1-800-TOSHIBA or surf [www.toshiba.com](http://www.toshiba.com).

# TOSHIBA

The World's Best Selling Portable Computers.

WHAT'S IT GOING  
TO TAKE TO GET A  
DATA NETWORK  
AS RELIABLE AS THE  
VOICE NETWORK?



The network revolution is here. Who do you want on your side?

**Lucant Technologies**  
But Later Innovations

405 Newcastle Avenue  
Morristown, NJ 07978-0416  
www.lucant.com  
1-800-4-LUCANT



# The Enterprise Network

LANs • WANs • Network Management

## Briefs

### Switch deal

Cabletron Systems Inc. in Rochester, N.Y., has announced a promotion in which users who buy three SmartSwitch 6000 Fast Ethernet modules at \$6,495 each get the switch chassis and power supply — a \$4,350 value — for free. The promotion runs through February.

### Workgroup switches

Allied Telesys International in Sunnyvale, Calif., is shipping two Ethernet workgroup switches. The \$1,514 AT-3725XL has 24 switched Ethernet ports, one 10/100/1000 bi/sec. uplink and a slot for another uplink. The \$999 AT-3725DL has 16 switched Ethernet ports, one 10/100/1000 bi/sec. uplink and a slot for an additional uplink.

### Instant AT&T

AT&T Worldnet Service will offer an instant messaging service for its 1.3 million subscribers. The technology is based on PowWow chat software from Tribal Voice in Scotts Valley, Calif. After downloading the I M Here software, users can create a "buddy list" of the names and online addresses of other I M Here and PowWow users and send text messages that pop up on a user's screen like an electronic sticky note. They can host a 10-person PowWow community free for a year. Users can download a copy from [www.att.net](http://www.att.net).

### Stopping viruses

Capetrino, Calif.-based Trend Micro Inc., a maker of virus-scanning software, has announced InterScan Applet Trap, which the company says stops malicious Java applets, ActiveX and JavaScript at the Internet gateway. The product attaches "wrappers" to suspect applets and code, tracks the code's behavior across the network and can shut down malicious code. Configuration and management are done at the server. Pricing starts at about \$180 for a 32-user license. Version 1.0 will ship this month.

## Virtual net increases security

• Oil firm: GTE network will cost less than toll-free dial-up connections

By Matt Hamblen

CROWN CENTRAL PETROLEUM Corp. in Baltimore is deploying a virtual private network (VPN) service that will add a layer of security for remote access and still cost less than the company currently spends on toll-free dial-up connections.

Crown, a \$1.6 billion gasoline refiner, distributor and retailer in the U.S. Southeast, has been participating since November in a free trial of a service called VPN Advantage. The provider is the Cambridge, Mass.-based GTE Internetworking division of GTE Corp.

About 150 remote users, including district managers in stores throughout the Southeast and workers in refineries and distribution centers in Texas, connect using the service. They do so by making a local call to a GTE remote access server,

### Projected worldwide market for VPNs\*

1998	\$150M
2002	\$2.4B

\*Virtual private networks provided by service providers over an Internet Protocol network

Source: The Yankee Group, Boston

which gives them a secure connection across GTE's backbone and the Internet to the Crown network, according to Miguel Montañez, group manager of information systems at Crown.

GTE Internetworking offers local voice and data service in nearly every city in which Crown has offices, meaning there's no network delay going through the switches of another local provider, he said.

When GTE Internetworking begins charging for the service

early this year, Crown expects to spend 10% less for remote access than the \$1,000 to \$4,000 it now spends monthly on toll-free service.

"It will achieve savings and also give us the opportunity to outsource our remote access in a way that is secure," Montañez said. "GTE [Internetworking] has the experience to provide that service, and Crown won't have to worry about growing experts in this very complex security technology."

Montañez said he found GTE Internetworking after a formal bidding process targeted at

gaining improved Internet access and managed firewall security.

VPN Advantage manages Crown's security through its own network operations center in Burlington, Mass., with device and user authentication through X.509 certificates. Data Encryption Standard encryption and tunneling techniques

Analyst Matthew Kozar at The Yankee Group in Boston said GTE Internetworking's guarantee of 99.9% availability for users connecting directly across its backbone network makes it the "industry leader" in this area.

Virtual net, page 38

## Snapshots

### EVOLUTION OF THE E-MAIL BUG

**WHEN:** Pre-1998 (Attachment era)

**DELIVERY METHOD:** Virus embedded in attachment

**TRIGGER:** User must launch attachment for infection

**TARGET:** Individuals

**DAMAGE:** Corrupted/deleted files, infected boot sector

**WHEN:** 1998 (Web page era)

**DELIVERY METHOD:** Java/ActiveX code embedded in Web page

**TRIGGER:** Code runs automatically when page is viewed

**TARGET:** Unsuspecting Web surfer

**DAMAGE:** Stolen passwords, denial of service, deleted files, stolen data; applets transport other viruses

**WHEN:** 1999 and beyond (Active mail era)

**DELIVERY METHOD:** Malicious Java/ActiveX in E-mail

**TRIGGER:** Code runs automatically when user opens E-mail

**TARGET:** Entire company

**DAMAGE:** Thousands of PCs can be disabled

Source: Winster Research Inc., Cambridge, Mass.

## Backing up open files gets cheaper

By Nancy Dillon

IT'S THE NEW every network administrator hates to give: A file requested for recovery somehow didn't make it onto the latest backup tape.

Gordon Mills recently had to deliver such a bombshell to one

of his users. The file that his user wanted wasn't available because it had been left open overnight and was thus skipped by the server's backup software.

Mills is the network administrator at Petroleum Helicopters Inc., an aviation company in Lafayette, La. "On a given

night, it's probably 100 files out of 150,000" that are skipped because they are open during the backup, he said. "This may not sound like a lot, but you have to figure: these are the files people are using the most."

Mark Nicolett, an analyst at Garner Group Inc. in Stamford, Conn., said the need to back up active systems is

growing. He said products on the high end include hardware-based, data-copy software from companies such as EMC Corp. in Hopkinton, Mass. They can work with multiple data platforms, from Windows to mainframe, and create online data copies for tasks such as backup, testing and data warehouse population.

But for network administrators who don't have to worry about mainframes and who can live with data-copy software designed solely for tape backup, most network backup software now offers sub-\$1,000

open-file backup agents.

For example, Seagate Technology Inc. in Scotts Valley, Calif., has a new open-file agent called Open File Option that integrates with the Windows NT version of Seagate's backup product, Backup Exec. The \$695-per-server agent creates a disk-volume snapshot without affecting access to files and then sends the volume copy to tape.

"We'll definitely use [Open File Option]," said Peter Burrows, a senior storage architect at ATEC Corp. in New York. Burrows helps oversee more

Open File, page 38

### OTHER STORAGE CONCERNS

What are the key problems you face when backing up Windows NT?

Traffic over the network	41%
Takes too much time/slow	39%
Too much downtime	26%
Backup system reliability	26%

Insufficient backup storage capacity 10%

Base August 1998 survey of 149 user organizations;

multiple responses allowed.  
Source: Frost/STG, New York for EMC Corp., Hopkinton, Mass.

# Virtual net

CONTINUED FROM PAGE 37

Availability guarantees on GTE Inter-networking dial-up connections drop to 97%, but that number still is competitive, analysts said.

GTE shares the top three spots in the VPN market with Sprint Corp. and

UNet Technologies Inc., a subsidiary of MCI WorldCom Inc., Koval said.

"VPNs work because companies don't want to do security, or shouldn't," said Ellen Carney, an analyst at Dataquest in Lowell, Mass. "At many companies, the person responsible for security was a network administrator only two days before, and that's not good enough."

If the original VPN pans out, Crown will consider connecting the point-of-sale

systems at its 246 service stations to gather sales data, Montanez said.

Equity analyst Alvin Silber at Herzog, Henne and Geduld in New York said investment in fast, secure remote access is standard in the highly competitive oil industry. And, he said, good security might help reduce the risk of network interruptions in Texas, where Crown has been involved in a protracted dispute with union workers. □

## MORE ONLINE

For resources related to virtual private networks, visit Computerworld online.

[www.computerworld.com/more](http://www.computerworld.com/more)

# Open files

CONTINUED FROM PAGE 37

than 1,000 NT servers running Backup Exec. "It's really necessary [today] because we have to pick a point and capture as much as we can and move on. We don't have time to return to a file that someone's working on."

Mills said he too plans to implement Open File Option. He has tested the software and said the simplicity of "checking a box to create a job is convenient." But, he said, he would like the freedom to deselect some files to reduce processing overhead.

"Right now, [Open File Option] is more of a vulnerability option that's either on or off," he said.

A similar product is Backup Agent for Open Files from Computer Associates International Inc. in Islandia, N.Y. The \$795-per-server agent works with CA's ArcServeIT backup software, but unlike the volume-level approach of Seagate's agent, it works on a file-by-file basis.

The offerings from both Seagate and CA provide a generic approach to open file backups. They treat all files the same, whether they're documents, e-mail or database entries.

Officials at both companies said that users who want tighter control over the backup of individual applications should choose backup agents that are database-specific.

An example would be Seagate's \$695 Backup Exec Agent for Microsoft Corp.'s SQL Server. Similarly, CA offers a SQL backup agent for \$795. □

## IN THE Y2K RACE, THE FINISH LINE IS JUST THE BEGINNING.

When the dust settles in January 2000, it'll be easy to spot the real Y2K champions. They won't be standing around the winner's circle. They'll be racing ahead to the next challenge. Because they know each new one - from distributed systems management to enterprise applications to e-commerce - presents enormous opportunities to seize victory for their enterprises.

You'll recognize them by the team they run with. Millennium III.

### Not just solutions for Y2K. Solutions with a future.

We're the premier provider of comprehensive, integrated solutions for Y2K and beyond. We don't just help you survive events. We make sure you gain momentum with every stride.

### What obstacles can we help you overcome?

Y2K compliance? CONVERSION2000™, our industry-acclaimed, end-to-end process, has a world class track record for addressing all dimensions of the Y2K problem.

Distributed system Y2K risks? Millennium III's LINC2000™ delivers Y2K compliance while laying the foundation for effective

distributed systems management beyond 2000.

Contingency planning? Whether focused on IT, value chain or business infrastructure, our SOS2000™ service ensures you have the plans in place to deal with Y2K or any crisis your organization may face.

Proving your compliance? Our TEST2000™ service includes both end-to-end testing and Independent Validation & Verification (IV&V), designed to ensure that what you've changed works as expected.

Project or program reviews? To make sure your Y2K project is headed in the right direction, our AUDIT2000™ service identifies project risk areas and recommends how to mitigate those risks.

The Y2K race isn't just about lines of code, or finish lines. It's about securing your enterprise's future and then taking it to new levels. If that's how you see it, come run with us. And leave the pack in the dust.

Call us today:  
U.S. - 1-888-522-3908  
U.K. - 44(0)1932 339 100  
Or visit our website at:  
[www.millennium3.com](http://www.millennium3.com)

**M**  
MILLENNIA III  
THE FUTURE BEGINS

## NEW PRODUCT

ARGENT SOFTWARE INC. has announced Argent Management Facility Release 3.4 - monitoring and alerting software for Windows NT Servers.

The Torrington, Conn., company said the software includes predefined parameters so sites can immediately begin monitoring SQL servers and other critical nodes in the enterprise. It can integrate into management frameworks and send alerts via e-mail or pager.

Pricing is \$4,000 for the first 10 nodes and \$2,000 for each additional 10 nodes.

Argent Software  
(603) 883-6000  
[www.argentsoftware.com](http://www.argentsoftware.com)

## Just Another Casual Friday.

Many insurance providers are waiting until next year to beg their way back into the IT business they abandoned in 1998.

CCBSure has been insuring the IT industry all along.

So, December 31 is not the day we prepare to re-enter the market - it's simply the day we wear jeans to the office.

Business as usual.

31

Friday  
December  
1999

**CCB**  
*sure*

Insurance for the  
Information Technology Industry

# The Future.

Previews now showing.



In the Computerworld 1999 Forecast Issue  
(See the center of this issue.)

The problem with the future is that it takes so long to arrive. Get an exclusive first look at how it will take shape in "The Next 10 Years," a special supplement bound into the center of this issue of Computerworld. The supplement brings together leading visionaries like Bill Gates, Scott McNealy, Larry Ellison, and David Bowie, each pontificating on what 1999 will bring to technology and what it means to the way we'll do business.

Don't let tomorrow take you by surprise.  
Read "The Next 10 Years" today.

If the supplement has already been removed, e-mail Computerworld at [circledes@computerworld.com](mailto:circledes@computerworld.com) for another copy.

**COMPUTERWORLD**  
The World's Technology Newspaper

©1999 Computerworld, Inc.



AN EDITORIAL SUPPLEMENT TO

COMPUTERWORLD

The  
**NEXT  
DECADE**

20 Visionaries  
10 Years

# When business wants to unite the Web and the enterprise...

## Business uses EDA middleware.

*With our new intranet-based decision support system we are able to roll up budget projections in less than 10 minutes.*

Kevin Rasmussen, Export Applications Coordinator, Gulf Canada

*Information Builders helped us prototype a home banking system in two weeks.*

John Smith, Assistant Vice President, Bank of Montreal

Using Java and Information Builders EDA middleware, Grupo Financiero Bital in Mexico City is able to quickly create applications that provide managers and customers with Web access to its mainframe transaction and financial systems.

In the oil and gas business, proactive monitoring of production and costs versus operating budgets is a mission-critical function. That's why Gulf decided it needed a faster way to collect and analyze this information from its field locations around the world. The solution... a Web-enabled data entry and reporting system using Information Builders' EDA middleware, Cactus and WebFOCUS. The application, which required almost no training,

lets each location update Gulf's databases right over the corporate intranet. Analysts can now roll up the data in less than 10 minutes, create reports from their Web browsers, and evaluate the impact of regional decisions on the big picture.

*"In less than two months, we reduced order status calls by 40%, enhanced customer relations, and stimulated new business by driving customers to our Web site."*

Don Boer, Data Warehouse Manager, Paradyne Corporation

Using Information Builders EDA middleware and WebFOCUS reporting engine, Paradyne built a Web-based order status system that allows customers to launch dynamic queries against live mainframe data.

The whole system was built in 90 days. And in less than two months Paradyne reduced order status phone calls by over 40%.

CALL THE BUILDERS



[www.ibl.com/ecw](http://www.ibl.com/ecw)  
(800) 969-INFO

In Canada call (416) 364-2750

IBI and FOCUS are trademarks of Information Builders, Inc.

**Information Builders**

Building Tomorrow's Information Systems

## FROM THE EDITORS

HERE'S THE MOST REVEALING thing you can say about the pace of change in computing. One day, the speed of light will be a bottleneck.

No wonder predicting the future is difficult.

But the IT industry has never lacked people who are willing to take on a challenge. We found 30 visionaries who gave it a shot. Rock stars, recent college grads, Internet pioneers, veteran CIOs—a roster of dazzling depth and breadth.

It was an honor to put this special issue together. We believe these visionaries paint a compelling picture of what's to come in the next decade. Some may have logged more computing decades than others, but through a vast array of strategies and technologies, they are all shaping one future.

Ten years is closer than you think. Take a look ahead and enjoy.

*John Updegraff*  
*Joyce Chutchan-Ferranti*

For audio and extended versions of these stories, see our Web site at [www.computerworld.com/nextdecade](http://www.computerworld.com/nextdecade)

## THE NEXT DECADE

### EDITORS

Joyce Chutchan-Ferranti  
Sieve Ulfelder

### MANAGING EDITOR

Jamie Eckle

### ART DIRECTOR

Mary Beth Welch

### ONLINE EDITOR

Johanna Ambrosio

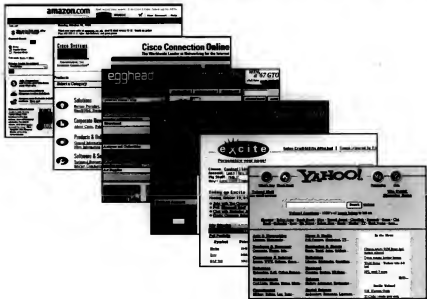
### COMPUTERWORLD EDITOR IN CHIEF

Paul Gillin

3  ARNO PENZIAS by Gary H. Anthes	26  SALMAN KHAN by John H. Johnson	28  BILL GATES by Paul Gillin
4  ERIC LANDER by Kathleen Molyneux	32  ANN WINBLAD by Julia King	41  JOEL BIRNBAUM by David Orenstein
8  DAVID BOWIE by Kim S. Nash	36  JARON LANIER by Barb Cole-Gomolski	35  LEWIS BRANSCOMB by Gary H. Anthes
14  TIM BERNERS-LEE MARC ANDREESSEN VINI CERF by Glenn Gruen	18  SCOTT MCNEALY by Maryfran Johnson	45  LARRY ELLISON by Paul Gillin
23  PATTI MAES by Johanna Ambrosio	38  MAX HOPPER, CHARLIE FELD, MIKE HESCHEL by Allan E. Alter	47  JOHN SEELY BROWN by Anne McCross
	42  MARK GEMICKI by Laura DiDie	43  KILLJOY CORNER by Mitch Betts

# The *biggest*

and best Web sites use Oracle.



*Oracle® is the foundation of the Internet.*



MicroWorld  
971

From Amazon.com to Yahoo!, the most popular Web sites depend on Oracle's ability to handle huge numbers of users and enormous quantities of information—text, images, audio, video—everything. In fact, nearly 70% of the Internet's top e-commerce sites use Oracle®. And with the introduction of Oracle®<sup>9i</sup>, things will get even better. To find out why

Oracle is the foundation of the Internet, visit us at

[www.oracle.com/info/25](http://www.oracle.com/info/25) or call 1-800-633-0517, ext. 18859.

**ORACLE®**

© 1998 Oracle Corporation. All rights reserved. Oracle is a registered trademark and this logo is a trademark of Oracle Corporation. All other names may be trademarks of their respective owners. \* 1998 GigaMarket Marketing Survey

# Glass Village

**FEW PEOPLE CAN MATCH THE BREADTH OF VISION** of physicist and communications wizard Arno A. Penzias. He shared a Nobel Prize in 1978 for his discovery of radio waves that were sparked 15 billion years ago at the universe's Big Bang birth. But he's equally comfortable in realms where events are clocked in nanoseconds. Penzias, 65, recently retired from his post as chief scientist of Bell Laboratories, the R&D arm of Lucent Technologies Inc., where he worked for 37 years on projects that ranged from radio physics to calling-card fraud prevention. He recently spoke to *Computerworld* editor at large Gary H. Anthes.

**CW: How will networking evolve?**

**PENZIAS:** Instead of one size fits all, we'll see a multiplicity of specialized global networks — networks for telephony, a high-powered Internet, an [Asynchronous Transfer Mode] fabric, maybe a network for data backup. At the lowest level, we'll see group fabrics. Home networks are group fabrics, but I won't call them "local" because your elderly relative in a nursing home will be on it. It will take care of not just telephones but computers, faxes, burglar alarms, pet monitors — all kinds of stuff.

**CW: So everything will be connected?**

**PENZIAS:** Yes. Many home appliances will have IP addresses; it's cheaper to make networked appliances than stand-alone ones — the boxes cost nothing per pound, and you centralize the complexity.

**CW: Who will manage this centralized complexity?**

**PENZIAS:** The care and feeding of your network will be by a telephone company, or telephone-like company. For them, dial tone is no big deal; transmission is no big deal. The only big deal is making everything work together, and you'll pay them to do that. Service providers will need to attract connections with other entities — such as the speech-recognition system you've trained — to compete for your business.

**CW: The telephone company will program my VCR?**

**PENZIAS:** To some extent,

they'll have to because you're not going to be able to do it. Things you used to do for yourself, like your income tax, you don't do anymore because they are too complex.

**CW: What will happen in the workplace?**

**PENZIAS:** Much will be customized for the individual worker. That's how you get maximum productivity. McDonald's does this now. The person behind the counter who can't make change just pushes the button for the Big Mac. Interfaces will be designed for you. You may be left-handed, or a terrible speller. You have certain quirks, and over time, the machine will take care of that. Individual programs will grow increasingly customized as they get used to your behavior through background data mining. You don't get rid of standards, but you can make it look standard to the machine and custom to the user.

**CW: What will be the killer apps in the corporation?**

**PENZIAS:** Data mining will become much more important. Your bank will know everything you've bought. Companies will throw away nothing they know about their customers because it will be so valuable. If you're not doing this, you're out of business.

**CW: What are the systems implications of that?**

**PENZIAS:** There will be huge databases everywhere. They will get bigger than processors, so you have to back them up in

some mountain in Tennessee at night. You're not going to do that through an IP network. You'll have some super-SCSI thing in the back with a fiber-channel network. This will not be on the Internet. It will be a different network altogether.

**CW: Won't people object to all this data gathering?**

**PENZIAS:** There's no way to keep the information away from the vendors you use. But there will be laws saying companies can't sell the information. You may get better service as a result, but you ought to demand that no one sell it without your permission. We're living in a glass village — glass fibers so you can see everybody, and glass walls so they can see you.

**CW: Will there be major improvements in software quality?**

**PENZIAS:** Software will always move to the break point. The bells and whistles — the bloatware — that people come to expect are phenomenal. The stuff will always crash because there's no way to exhaustively test it. There are things like Linux that are quite robust, but they don't do all the stuff you'd expect. Every part of Windows 95 works perfectly, but the pieces don't work together because it's got too many parts.

**CW: So developers should focus more on interfaces?**

**PENZIAS:** Yes. In the end, the only thing that counts is how well things work together. Why does anybody buy Microsoft Word instead of WordPerfect? Because it works with something else. It's the interfaces — not content — that count. □



## ARNO PENZIAS

IN THE END, THE ONLY THING THAT  
COUNTS IS HOW WELL THINGS WORK  
TOGETHER. IT'S THE INTERFACES  
— NOT CONTENT — THAT COUNT.



**“BEING A PURE MATHEMATICIAN, I THINK  
BUT THEN YOU HAVE TO TURN YOURSELF**

# ERIC LANDER

By Kathleen Melymuka / IN 1974, AS A STUDENT AT NEW YORK'S PRESTIGIOUS Stuyvesant High School, Eric Lander won first place in the Westinghouse Science Talent Search for a paper on quasiperfect numbers. He noted in his application that the project gave him "a respect for the computer as a useful tool rather than just a toy."

The fact that 17-year-old Lander had considered Stuyvesant's IBM mainframe a toy hints at where this kid was coming from. The game he played on it hints at where he was heading. "We played the game of life," he says. "Cells are born, develop into self-organizing patterns, die."

Today, the 41-year-old Lander is one of the major players in the Human Genome Project, a 15-year effort, begun in 1990, to identify all 100,000 or so genes and determine the exact code inside each, a total of about 3 billion fragments that make up human DNA.

Lander says that the human genome map will provide medicine with the kind of dramatic insights that the periodic table contributed to chemistry and that scientists will use it to begin to understand how genes function in diseases and inheritable conditions.

When Lander looks ahead to the next decade, he focuses on simplicity. "In science and biology, there aren't very many problems I know of where we're fundamentally unable to do something just because of a computing limitation," he says. "We're not limited by the availability of good ideas or the computers to run the software, but it takes longer to turn a good idea into good software than it should."

The challenge is to simplify

the task of writing code, he says. "If it was 10 times easier to write good stuff, that would have more of an effect than a tenfold increase in speed."

The need to simplify runs through all of Lander's ruminations about 2008. "Being a pure mathematician, I think of computation in a very simple way, but then you have to turn yourself into a pretzel to actually compute," he says. "There are far too many utterly irrelevant details you have to know to interact with a computer."

In his own life, for example, Lander has PCs in three offices at work and an office at home. He has a portable PC and a cellular phone, "and they all still remain different from each other," he says. "The real achievement will be a much more seamless integration."

Lander says he hopes that by 2008, people will use the power of computers to make interacting with them simple and uniform. "Whether we'll achieve that in 10 years, I don't know," he says, "but clearly we will make some progress as computing intrudes itself into other aspects of life."

But just what those other aspects might be could use some prioritizing, he says. Landers says he thinks the Jetsons-inspired visions of technology's future miss the point.

"I'm not so much into my home being so smart it can

turn on the light," he says.

"Turning on the lights is not that big a problem for me. But I do mind that my ways of gaining access to information are still clunky."

Lander says the zenith of chunky information access is the Internet, and here he sees the main challenge and the real promise of the next decade. "[The] Internet is a spectacular thing," he says, "but it's still unbelievably complicated to get a coherent picture of what's out there, and every day the same search pulls up more and more."

#### DIFFICULT TO DO

The more difficult it is to do something, the less often we do it, he says. And we use it in fewer aspects of our lives. "We haven't built a system to digest the information in a more coherent way," he explains. "The goal has to be to make it so natural and smooth that when we want to know something, we can just get it."

Currently, Lander says, the Internet is like a card catalog you use to pull down books instead of a database with answers to questions. "The thing you want to be able to do that you can't do now is phrase queries," he says. "The challenge is to make [the] Internet have a front end to which you can ask intelligent questions and get reasonable answers

rather than a data dump."

Today's technology is clearly on the way to that goal, he says, with specialized agents programmed to retrieve all kinds of information. But the challenge is to create a general agent, not a specialized one — "a system that can parse what you're trying to look for."

The improved Internet will bring technology's biggest impact: connectivity, which will redefine communities and so have "a huge impact on the world," Lander predicts. "We're just beginning to glimpse the consequences of being able to connect with knowledge and people in these ways," he says.

"If we can overcome the ergonomic challenges of making it natural and easy to use, that will have an effect on culture that is really hard to estimate."

For example, connectivity will change the way we work and live, he says. "When we have ready and easy and smooth access to video technology, I believe we can have meetings that aren't in person but still have face-to-face quality. Now, bandwidths are not up to it. We did ourselves. But there have to be ways to use interfaces with computers to be able to meet with somebody in a satisfying way. When you can truly feel a presence with somebody over a high-speed network, it will really transform community." □

OF COMPUTATION IN A VERY SIMPLE WAY,  
INTO A PRETZEL TO ACTUALLY COMPUTE."

**WE START WITH  
THE VERY LATEST PENTIUM II  
XEON PROCESSORS AND  
TERABYTES OF FIBRE CHANNEL STORAGE.**



**WE FACTORY INSTALL YOUR  
INDUSTRY STANDARD OS  
AND YOUR CUSTOM SOFTWARE.  
THEN TEST EVERYTHING.**



# **WHAT'S DELL DOING IN DATA CENTERS?**





pentium  
III  
Xeon

**YOU CAN WATCH AS A DELL-CERTIFIED  
SYSTEMS ENGINEER INSTALLS IT AT YOUR SITE.**

**Dell PowerEdge 6300  
Data Center Server**

Up to four Pentium III Xeon

processors at 4.0 GHz

Up to 4 GB of ECC memory

Up to 1,200 GB of internal EIDE SCSI storage

Seven hot-plug-ready PCI slots

Redundant hot-plug power supplies and

cooling fans

Certified technicians on call 24/7

Here's a new idea for your data center.

Call Dell.

Our PowerEdge 6300 Intel-based server can harness up to four Pentium III Xeon<sup>®</sup> processors simultaneously. It has seven PCI hot-plug-ready slots. And up to 4 GB of internal memory.

Add our end-to-end PowerVault<sup>™</sup> fibre channel storage solution. Up to one terabyte of storage with 15,000 IOPS per second.

Both can be installed by a Dell-certified systems engineer. Both come with 7x24 phone support. Both have optional support plans that can be tailored to your needs.

Call 1-888-887-DELL. It's an idea whose time has come.

BE DIRECT

**DELL**  
www.dell.com/reliable

© 2000 Dell Computer Corporation. Dell, the Dell logo and PowerEdge are registered trademarks of Dell Computer Corporation.

PowerVault is a registered trademark of Dell Computer Corporation. Pentium III Xeon is a registered trademark of Intel Corporation. All other trademarks are the property of their respective owners.



#### STARTING HIS FOURTH DECADE IN THE

limelight, musician and philosopher/trendsetter David Bowie is no stranger to technology. Since the mid-1980s, Bowie has used his Macintosh to create lithographs and write lyrics. Now, at age 51, he's into the Internet. BowieNet ([www.davidbowie.com](http://www.davidbowie.com)) is his latest project, a portal at which Bowie keeps a personal journal and chats every day with fans. (He also lurks in chat rooms under a handful of assumed names to observe.) Next, Bowie wants to add three-dimensional avatars — on-screen representations to let members create online personas. He also plans to broadcast a live recording session with a 360-degree camera from Lucent Technologies Inc. All this, he tells *Computerworld* senior editor Kim S. Nash, is so “we can know each other in new ways.”

# Ch-Ch-Ch-Ch- CHANGES



**BOWIE SPEAKS:** My interest in the Internet arose more than anything else because of my son's interest in computers. Being the doting father, I got involved because he was involved, in 1993 or '94. Before that, I was using the computer for writing and painting.

Then a friend of mine in Silicon Valley developed a cut-up computer program for me where it takes my chunks of prose and reassembles them for me. You end up with something very surreal.

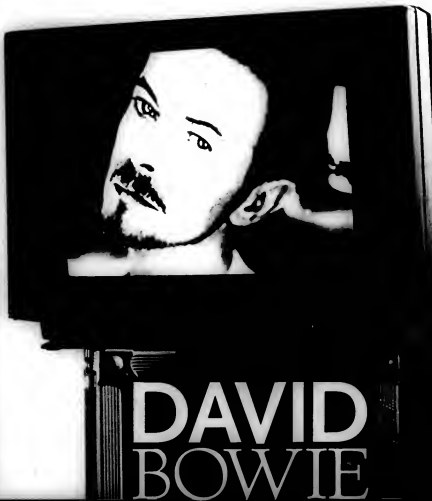
Cut-up prompts your mind into action. It might display something that you hadn't thought about or shine light on areas that, in rational thinking, maybe wouldn't have gotten there at all. But it's not new. It's the way that, indeed, James Joyce and William

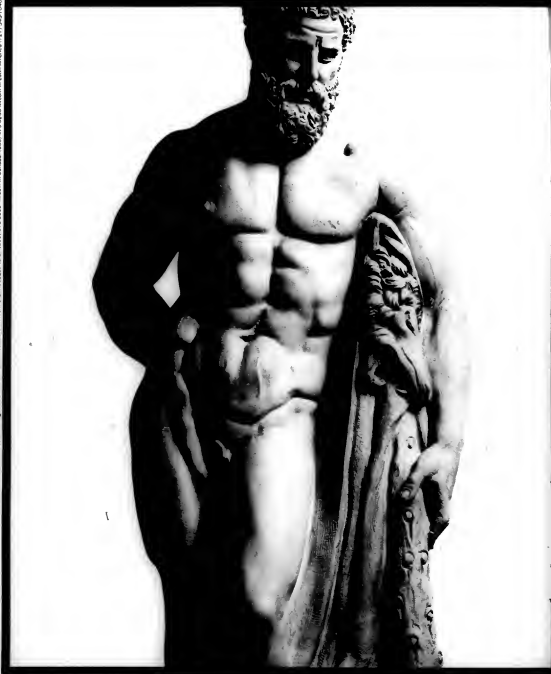
Burroughs worked, but they tended to work with scissors and glue. I thought, "Well, hell, it's such a bore to cut up lines of poetry or dialogue and reassemble them." So now the computer produces reams of stuff at my command. I took care of lyrics for the next hundred years! That form of writing is chaotic like the Internet, and like the Internet, will continue to be into the future.

I couldn't wait for the day to put up my own site. Virgin Records worked with me in 1995 to do it. But that was really a puff site.

About a year ago, I realized there were so many fan sites on me — 200 or so. I discussed the idea of integrating them somehow and that evolved into a sort of quirky portal; an individual-

CONTINUED ON PAGE 12





It usually happens when someone needs their PC Card the most. But it'll never happen with the family of RealPort™ Integrated PC Cards. There's nothing to break. Nothing to lose.

After years of connecting with external LAN and modem dongles, we came up with a better way. We got rid of them. You'll never have to stock extra cables again, and your mobile users will never call when they find themselves stranded and "dongle-less."



Whether it's a modem with V.90, an Ethernet card or an Ethernet+Modem, connect with the world's first Integrated PC Cards. Dongles are history. Connect with the times.

**RealPort**

**The Integrated PC Card**

*Nothing to Break. Nothing to Lose.*

# Lost the dongle.

[www.xircom.com](http://www.xircom.com)

1-877-RealPort

**Xircom**

Get mobile. Stay connected. Go places.

# DAVID BOWIE

CONTINUED FROM PAGE 9  
tural portal that revolves around me and music. There's no advertising. We want absolute freedom.

The chaos factor is a very important part of the Net. The most attractive thing is its decentralized nature. Despite what people say about Microsoft and all that, there's no real way it can actually be monopolized, and there never will be. Certain companies will try to eat up everything, but it's not going to happen. There will always be so many cowboys out there to keep it alive.

Someone said it's almost like having 1,000 books on your floor and not knowing where to start. That's how I live. That's how I think! The Internet really is a technology model of how I think. It thrives on its own chaos. It's willing to change its mind overnight, combine things that shouldn't be bedfellows. I see it as a brother.

The Net will become more and more exploratory, reducing itself into many, many smaller and informal units. Portals will emerge and dissolve with regularity. Corporate brand-name [Internet providers] will lose their flavor. People will want to keep the village aspect of the Net. We're banking on that. We're not sitting there counting eyeballs at BowieNet.

What's missing and will not be corrected in 10 years is the ubiquity of the television. Television is in everybody's home, and that isn't going to happen with the Internet. Maybe we'll get to 50%. This produces a technology version of haves and have-nots. Information is gold, there's that. But also schools that have the Net will have higher scores than those that don't. And that gulf will only widen. That's rather disconcerting.

People ask me about the distribution of music over the Internet. My heart says one thing, and my

wallet says another. Once everyone has his own CD-burning machine, you put together the album of your dream. That's what I'd like to do: Go to a heavyweight blues cangery and take down a particular track by Robert Johnson or John Lee Hooker. I'd be quite willing to pay per track.

The record corporations are just like King Harold, sitting there on the beach, on this throne, trying to order the sea back. They don't stand a chance. The industry isn't going to come crashing down, but [custom albums online] will be integrated into a new way of selling. They will not be able to stop this. There are too many little independent companies keen to do real online downloading. They will become so popular that, by force, corporations will have to capitulate. When there's a dollar in it, watch their knees bend.

Everyone talks about wearable computers in the years to come. Whether I go for that has an awful lot to do with who designs them: I'm quite fastidious about what I wear [laughs]. These huge vinyl boots — when you're 18, that's OK,

but not when you're 52. You hear about air-conditioned cooling suits or visor helmets so we can watch stock options flash before our eyes while we send E-mail from our wristwatches. It's all too silly.

Within the home, I love the idea of intelligent buildings completely wired, though I don't think I'd have anything like the Bill Gates house. I don't want it to look like you're living inside HAL — though I don't mind HAL living with me. But I like old-fashioned paintings on my wall. No flat video representations of them, either. I want to touch the paint and feel statues.

As pieces of my body start falling apart, I'll have them all replaced. All the ones that make life worth living — I'm talking of the brain, of course [laughs].

I suspect that I won't be living in a very different fashion in 2008. Why I fight the idea that my lifestyle would change is because it really didn't change that radically in the last 20 years. I don't see why it would in the next 10.

There's an in-built expectation [aroused] by this stupid millennium business. The buildup to the millennium is going to cause this agitated state between exhilaration and panic. Next year could be a frightening year. There will be such an enormous letdown when you wake up in 2000 and realize it's just another rainy Tuesday and your life hasn't changed, for the better or worse.

The biggest lifestyle change will be for parents and children. Unless parents get themselves computer literate, there will be a real disparity in knowledge and reference points. The child will think the parent is stupid, and the parent will become bitter and angry that he can't understand things. □

## "THE NET THRIVES ON ITS OWN CHAOS."



**Ask for three  
proposals before  
you award your  
networking business.**

**Ask to see  
this symbol, too.**



Putting your networking business out for bid is like putting your life on the line. You want to be certain your service provider has the right combination of services and technologies to meet your needs. You want to be certain of a reliable connection. You want to be certain of corporate security. You want to be certain your provider can grow with your business. That's where the Cisco Powered Network program comes in.

The Cisco Powered Network symbol is your assurance that a service provider is powered with the same equipment that virtually all the Internet traffic travels on today. Ask your service provider if they're part of the Cisco Powered Network program. Or visit [www.cisco.com/cpn](http://www.cisco.com/cpn) to find a list of authorized program participants. And take the uncertainty out of selecting your networking partner.



# Net, Web, Browse

IMAGINE CREATING SOMETHING THAT RESHAPES THE WORLD  
AND BEING AROUND TO WATCH THE FUN

That's what **MARC ANDREESSEN**, **TIM BERNERS-LEE** and **VINT CERF** have in common: They were instrumental in creating the Internet as we know it.

The first building block came from Cerf, who co-developed the TCP/IP protocol with Robert Kahn in the early 1970s and later ran the Internet effort at the U.S. Department of Defense's Advanced Research Projects Agency (ARPA), which funded many key Internet and computer developments in the '70s and '80s. He's now senior vice president for Internet architecture at MCI WorldCom Inc. in Jackson, Miss.

Then, in 1989, Berners-Lee created the Web while working at the CERN physics laboratories in Switzerland. He's now director of the W<sub>3</sub> Consortium, a council formed to steer the Web's development, at MIT's Laboratory for Computer Science.

The last building block came in the early 1990s from Andreessen, the principal architect of the first graphical browser, Mosaic, while he was a student at the University of Illinois at Urbana-Champaign. In 1994, he co-founded Netscape Communications Corp. in Mountain View, Calif. Recently, Netscape agreed to be acquired by America Online Inc.

Though each contributed a key building block to today's Net, none of the men sits around reminiscing about accomplishments.

CONTINUED ON PAGE 16





## TIM BERNERS-LEE

Now director of the W3 Consortium, Berners-Lee created the Web as a way to efficiently share information with CERN colleagues

## VINT CERF

When the networking pioneer left ARPA for MCI in 1982, colleagues wept

Netscape co-founder Andreessen brought the Net to millions, first with Mosaic, then Netscape

## MARC ANDREESSEN

# Net, Web, Browse



CONTINUED FROM PAGE 14

Instead, they're working to move the Internet to a new incarnation: a globally distributed network where information is accessible anywhere via a slew of terminals—from cell phones to desktop PCs.

Computerworld West Coast bureau chief Galen Gruman asked the three fathers of the Internet to share their vision of what technology will bring the world in a decade. Their global network vision is familiar to fans of Star Trek and Silicon Valley. But like most high-tech leaders in Silicon Valley, for them, it's the working plan for the future they continue to create with each new product, each new standard and each new technology.

#### THE INTERNET COMPUTING VISION

**ANDREESSEN:** No matter where you go, you'll have access to a computer of some kind that will allow you to tap in to your personal space and your personal information. So if we're working on a document in our office and then in a plane, there'll be a keyboard sitting there on the plane that will let us keep working with it that way. And the same thing in the hotel room, and the same thing in our pocket for the cab ride the next day, and the same thing at the next office we visit the day after that.

## "PHASE 1 HAS MADE THE WEB INTO ONE BIG BOOK IN WHICH PEOPLE BROWSE AROUND, WHICH IS COOL. BUT PHASE 2 WILL MAKE IT INTO ONE MAJOR DATABASE."

—TIM BERNERS-LEE

**CERF:** We need computing power distributed all over the place, and there will be times when it is quite necessary to do stand-alone kinds of computing, even if we're mostly connected to the network. The advantage of being able to get into the Net is that you can get to both databases and computing resources that would not be economically attractive otherwise. Making that more or less transparent so you can get to the resources that are appropriate at the time is one of the more exciting potentials for having continuous connectivity to the network.

#### GETTING THE INFRASTRUCTURE

**ANDREESSEN:** The goal is fully dynamic electronic commerce, where every business is online and able to buy or sell on a moment-by-moment basis — able to do real-time auctions and bidding for products from all over the world. But most of the systems required to really do that don't really exist.

**CERF:** One of my favorite fantasies is the idea of having almost incidental invocation of a business service as a consequence of an electronic transaction, where if you're going to do a transaction with someone and you're both mutually suspicious, a third party could offer insurance to cover both sides of the transaction. And all of that could be invoked automatically, and even competitively, if we had the right mechanisms in place.

**BERNERS-LEE:** Web Phase 1 has made the Web into one big book in which people browse around, which is cool. But Web Phase 2 will make it into one major database. An agent will check whether the transaction meets your privacy needs, your financial trust needs and whether the people you're dealing with in the chain are reasonable according to your particular threshold. But before it can happen, we've got to establish a whole infrastructure in which all the bases for electronic commerce — the sort

of catalog items — are exported as data.

**CERF:** One of the things that I found very attractive about some of the network applications is that rather than sending, for example, a big 25M-byte PowerPoint file along with an E-mail message, you send a very short message with a pointer to [the PowerPoint file]. And if you wanted to do something with it, you might be able to cause some other computer somewhere else on the network to do whatever it is you need it to do, or cause it to be printed somewhere else, without having to have it transmitted to you through what might turn out to be a pretty limited pipe. So this idea of getting multiple computers in different places to co-operate, to perform a function that you might have otherwise done locally, seems to me rather attractive.

**BERNERS-LEE:** The world works exchanging documents that use different vocabularies and different languages, but where there's enough partial understanding of one — where there's enough ability to be able to convert to be able to get by. With [Extensible Markup Language] and [Resource Definition Format], we are building into the technology the ability to communicate with partial understanding. This is going to be essential for the evolution of Web applications.

#### RETHINKING INTERACTION

**BERNERS-LEE:** I don't want to express something until I can do it with a keyboard, because I'm used to putting it in a random order and writing hypertext and jumping backward and forward, and I've started to lose the art of serialization. But when I try to get the hang of how ideas interrelate or draw a big plan, then I reach for a piece of paper that's as large as my desk. I spread it out. I get out a pencil and draw circles and arrows. It's the only way I can really put down all the interrelationships. And I don't have any application that could give me the ease of being able to see a 4-foot piece of paper at a glance.

**ANDREESSEN:** The big opportunity is to give everyone access to the Net over the normal analog phone connection without requiring a keyboard or device of any kind — just let you do whatever it is you need to do through a basic voice interface from anywhere. The interesting thing about that is it puts all the voice-recognition capability up in the network, not in the device.

**CERF:** One of the worst things about voice-response units is that you are forced to go through a menu of choices because you can't drive the system toward where you want to go very effectively. But if we had enough speech understanding, it would make all that information much more readily accessible.

**BERNERS-LEE:** We have to realize that when we talk to our machines, we're moving from the drag-and-drop world in which there's very little you have to remember about where you were. [With speech,] we're moving back to a conversational mode. That style of interface is very different, so it's, for example, difficult to take something that looks like a file system or menu system or Web site and turn it into something that will converse with you. So the art of engineering a conversational interface is something that we've got to learn a lot about. □

#### More online

For audio outtakes from this once-in-a-lifetime Internet roundtable, go to the Web version of *The Next Decade*.  
[www.computerworld.com/nextdecade](http://www.computerworld.com/nextdecade)

## It's baaaaaaaack: The new COBOL.



**"Relational DBMS and COBOL"** may sound like an oxymoron but the Tatung Company, one of the largest in the Republic of China, is using both in a hospital client/server system that delivers better patient care more efficiently. ACUCOBOL™-GT applications seamlessly send SQL queries to a Sybase DBMS and instantly retrieve patient histories, as well as providing easy access to portions of the database to accountants, purchasing agents and other employees. The prognosis is very healthy.

### Ben & Jerry's Homemade, Inc.

found that the real scoop on cross-platform compatibility isn't Java, it's ACUCOBOL-GT. They moved 460 programs and 1,000 screen components from a Novell Network on PCs to a new computer over a weekend. ACUCOBOL-GT was the clear choice because it runs on over 600 platforms.

Coffee Ole? anyone?



### The "Next Big Thing" for Web publishing is COBOL, and in fact,

our ACUCOBOL-GT plug-in. Clients just install it in their Netscape or Microsoft browser, then can run your ACUCOBOL-GT applications from a hyperlink or embedded in your page without a single line of new application code. It's an incredibly fast and efficient way to provide your employees, distributors and customers with access to order entry, inventory or other databases. Getting on the Web doesn't have to get hairy.



### Which came first?

#### Ask CSO (UK) and

they'll tell you exactly when the chickens and the eggs (not to mention the kippers, frozen peas and other products in our food chain) got to or will arrive at your favorite supermarket or bistro. When it came time to update their distribution software, they switched to ACUCOBOL-GT because it provided open access to relational DBMSs from Oracle and Informix, and made it easy to create the more than 500 GUI screens their users required. And now everything is sunny-side up.



### Actually, it never went away.

There are more lines of COBOL running than any other language, with billions of lines added every year.

And now with ACUCOBOL™-GT you can move those applications into the new millennium easily, often without changing a line of your current application code.

### Want a modern GUI?

Just add it to your existing applications with our ACUCOBOL-GT WYSIWYG screen painter, using the same "widgets" you find in VB and other front-ends.

### Web publishing?

It's easiest with ACUCOBOL-GT. Just add a hyperlink to your application or embed it in your page.

Then have your clients install our plug-in for their Netscape or Microsoft browser and you're done.

### Relational DBMS access?

Utterly seamless with Acu4GL™.

It executes COBOL I/O operations by invisibly generating SQL to get the answers you need, and supports identical source code across hardware platforms and RDBMSs including Oracle, Informix, Sybase and SQL Server.

### Cross-platform capabilities?

We were cross-platform when Java was still a bean, and today ACUCOBOL-GT runs applications unchanged on over 600 UNIX and Windows platforms.

Which all adds up to the fact that you can enhance your users' interaction while reusing code you know is reliable because it's been running for years — your COBOL code, the ultimate reusable resource. Everyone from your maintenance staff to your CEO will love it.

There's more, so check out the details on our Web site or call today and let us give you the whole story.

**It's the new COBOL. ACUCOBOL-GT.**

## ACUCORP

(800) 262-6585 • (619) 689-4450  
<http://www.acucorp.com>  
[TheNewCobol@acucorp.com](mailto:TheNewCobol@acucorp.com)

# 'I'M NOT A VISIONARY'

McNEALY'S VISIONS ARE OF NO COMPUTERS and only dozens of Webware applications that will surround and support nearly every aspect of our lives.

McNealy, 47, is a former executive at Sun Microsystems, where he was president of the company's software division. He left Sun in 1996 to start Netscape Communications Corp., which he now chairs. Netscape's Netscape Navigator browser is the most popular Web browser in the world, and the company's Netscape Communicator suite is the most popular Web browser and e-mail client. Netscape's Netscape Communicator suite is the most popular Web browser and e-mail client.

**CW:** What kind of role do you see computers playing 10 years from now?

**McNEALY:**

Computers will be everywhere. They will be used to control everything from the lights in your home to the cars you drive. They will be used to control everything from the lights in your home to the cars you drive. They will be used to control everything from the lights in your home to the cars you drive.

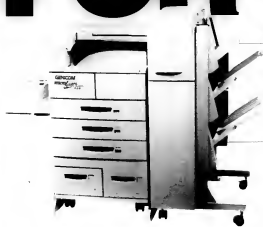
CONTINUED ON PAGE 2



**SCOTT  
McNEALY**

# ONE FOR ALL.

**\$200  
REBATE**  
www.genicom.com/rebate.htm  
Excludes taxes, freight, and shipping



**THE ONE PRINTER  
FOR YOUR ENTIRE  
DEPARTMENT.  
NETWORK READY!**

## *microLaser™ 320N with IntelliPrint™ Controller Architecture*

Print Speed: Up to 32 pages per minute  
Resolution: 1200 x 1200 dpi  
Duty Cycle: Up to 150,000 pages per month  
Processor: 133MHz RISC  
Memory: 32MB, expandable to 96MB  
Languages: Adobe PostScript 3, PCL 5e emulation with P.J.L.  
Std. Interfaces: Ethernet 10/100BaseT and 10Base2 IEEE 1284 parallel  
Paper Input: 1,050 sheets std. with automatic collating,  
3,550 maximum; up to 11" x 17"

It's the first in a new generation of network printers: GENICOM's microLaser 320N. Powered by our exclusive IntelliPrint controller architecture, the microLaser 320N brings you a superior combination of print speed and resolution — up to 32 ppm at true 1200 x 1200 dpi. The microLaser 320N includes Adobe PostScript 3 for faster image processing, increased font capacity, and photo-quality graphics! With standard collating/offsetting, remote web-based printer management, and optional finisher/stapler and 10-bin mailbox, the microLaser 320N is versatile enough for everyone in your department. Call GENICOM today and mention "one for all" to receive a free gift.



**GENICOM**  
**www.genicom.com**  
**1-800-GENICOM, Option 1,1**

©2000 GENICOM CORPORATION. GENICOM, the GENICOM logo, and the microLaser logo are registered trademarks of GENICOM CORPORATION. All other trademarks are the property of their respective owners. GENICOM and the GENICOM logo are registered trademarks of GENICOM CORPORATION.

IF THERE'S A SENSOR AND A CAMERA IN MY BATHROOM, I WOULD HAVE A BIG PROBLEM WITH THAT! BUT IF THEY HAVE, IN PALO ALTO SQUARE, A CAMERA WATCHING 24 HOURS A DAY IN A PUBLIC PLACE — I CONSIDER THAT A LIBERATING THING."



CONTINUED FROM PAGE 18

room. Everything else will be an appliance, which is network-aware and network-capable and network-connected.

**CW:** Does anything about that scenario seem, well, creepy to you? Will we get to the point where there's no information that's private anymore?

**McNEALY:** Well, if they've got a sensor and a camera in my bathroom, I would have a big problem with that! But if they have, in Palo Alto Square, a camera watching 24 hours a day in a public place? No, I consider that a liberating thing. Now there's a chance that if anybody does something bad to me, they're going to be recorded and caught.

**CW:** What will the PC of the future resemble?

**McNEALY:** There's no such thing as a personal computer in the future. There are only available appliances. You'll use your smart card or your smart ring or some sort of proximity device, so that as you get near it, the device knows who you are, what you're authorized to access — and you type in your password to get to whatever service you paid for.

**CW:** So how will we interact with these devices? What kind of interface do you envision?

**McNEALY:** The idea that you have a computer interface is just wrong. You'll have appliance interfaces. A computer in-

terface is some random thing invented by the folks up in Redmond. You're presuming that in 10 years we all still want to have our own personal mainframe under our arm or on our desktop, that we'll even want to carry 40 million lines of code around.

**CW:** Will we still be using key-boards? Or will we be speaking to these devices?

**McNEALY:** I don't know that speech technology is actually going to be more valuable than having the availability to just punch buttons. The whole concept behind our Jini [Java-based networking] technology is that the whole user interface comes with the device — as a Java applet that you can download to a variety of devices. Take this chameleonlike device called the PalmPilot, for example. You carry it around with you, and when you want to do the TV, you hit a button and it becomes the remote control; or when you want to make a phone call, it becomes a phone device.

**CW:** But with Java and Jini figuring so heavily in this future, you're talking about technology Sun owns and controls. Are you envisioning yourselves as the IBM or the Microsoft of the next millennium?

**McNEALY:** You're asking the CEO of Sun where he thinks the world is going. If he thinks the world is going to go in a different direction than where he's taking his company, some-

body ought to fire him! Just go back 15 years or even 10 and we were saying, "The network is the computer," and people looked at us like, "What are you talking about?" Now every body gets it.

**CW:** What are some of the future uses you see for the Internet?

**McNEALY:** I think the Net will continue to provide every media type you can think about. There will be a standardization for audio, video, messaging, file, print, fax, voice recognition, compression, security — all of those kinds of things. As we move forward, I don't know that any one will matter more than the others. I can tell you that people will be doing ASCII E-mail forever, though, because it's easy and it's simple.

**CW:** Where are the growth opportunities in this future?

**McNEALY:** The growth will come from a lot of little companies and some big companies that have a tradition and a mode of operation that actually allows for innovation. All of a sudden, it's zero cost of goods sold and zero publishing costs for software, so innovation can come from any genius anywhere at any time. Look at what Linux Tervola has been able to do [with Linux, the free ware version of Unix]. There's a whole range of products out there the world needs. I think a lot of innovation happens there.

**CW:** In the next decade, how much computing power will \$100 buy?

**McNEALY:** None. I'd put it all into the display, because that would be the porthole to the network, where all the computing power lies. In the future, am I going to buy a computer? No. Corporations will stop buying computers. They'll start leasing access to these computing environments. Consider how, today, there is phone access built in to all kinds of devices. Your car has a portable phone. When you swipe your Visa card, you're going out over the phone line. In the Web-tone world, there will be just such a network, where you have all of these IP services out there on the network, accessible from every kind of client-side device. You don't buy a computer. You buy a phone that can access IP services.

**CW:** With these self-sustaining networks you envision, it sounds like a lot fewer jobs for information technology professionals.

**McNEALY:** Probably. As we move technologies into the service providers and start providing application tone, Web tone, data tone and E-commerce tone, the need for a value-added reseller to help all these individual companies goes away. There will be a couple of mail providers to the service providers, a couple of news providers, a couple of Web site providers.

**CW:** So you see an enormous shrinkage from the size of today's computer industry?

**McNEALY:** No, I see an enormous shrinkage in the size of our competitors [laughs]. See? I'm being a visionary! ☐

# Netscape

NOW IN EVERY SUPPLY CLOSET

**BOISE CASCADE** Office Products Corporation has long been one of the world's premier distributors of office supplies because of excellent service and commitment to their customers. But would that be enough to ensure their success in the Net economy? To help them uphold their motto, "Consider it done," we developed an online catalog tied to an automated order-processing system. This not only made ordering simpler for their customers, but in the first year alone saved the company one million dollars. What made it possible? Netscape CommerceXpert software. Today, there's no telling what business will break away from the competition with a Netscape solution. Learn more with a free information packet: call 888-200-5764 or visit [home.netscape.com/breakaway](http://home.netscape.com/breakaway)



NETSCAPE®

# When ASAP Isn't Soon Enough...

Only QAD Offers Industry-Specific Solutions for Automotive, Consumer Products, Electronics, Food & Beverage, Industrial Products, and Medical Industries.

## Get A Y2K-Ready Solution Now.

Face it, the year 2000 is fast approaching and you need to get your new ERP solution in place quickly. But with some vendors, there's no telling when you'll see results. A year from now, two years from now, or maybe never is no way to run a business.

Truth be told, QAD's MFG/PRO® supply-chain-enabled ERP software has always been Y2K ready. And our software running on IBM RS/6000 and Netfinity servers is ideal for midrange to large manufacturing companies with distributed operations.

What's more, when it comes to rapid deployment of single or multisite business solutions supporting 16 to 1,000+ concurrent users, no one even comes close to matching our record for fast installations.

In less time than it takes most other vendors to define your requirements, we can roll out complete solutions that will take you into the next millennium.

Thanks to our rapid implementation methodology, industry-specific expertise, and global alliances, QAD systems are installable in four months—more than four times faster than the industry norm. And because of the proven scalability of our software running on IBM UNIX or Windows NT servers, additional sites can be rolled out virtually overnight, no matter where they are located.

So if you're looking for quick results and ASAP isn't soon enough, call the people who really understand the need for speed.



*The speed to run your business.™*

QAD GLOBAL MARKETING 6450 VIA REAL CARPINTERIA, CALIFORNIA 93013 USA TEL: +1 800 218 3434 X333 (USA ONLY) +1 805 565 4333 X333 WWW.QAD.COM

© 1999 QAD, Inc. All rights reserved. QAD, MFG/PRO, and QAD Business Partner are registered trademarks of QAD, Inc. IBM, RS/6000, and Netfinity are trademarks of International Business Machines Corporation. All other trademarks are the property of their respective owners. QAD, MFG/PRO, and QAD Business Partner are not responsible for the content of any website or other electronic or printed material that may be accessed through the Internet. The information on this website is for informational purposes only and does not constitute an offer of any product or service. QAD, MFG/PRO, and QAD Business Partner are not responsible for the content of any website or other electronic or printed material that may be accessed through the Internet. The information on this website is for informational purposes only and does not constitute an offer of any product or service. QAD, MFG/PRO, and QAD Business Partner are not responsible for the content of any website or other electronic or printed material that may be accessed through the Internet. The information on this website is for informational purposes only and does not constitute an offer of any product or service.



# Agent Secrets

PATTIE MAES IS AN ASSOCIATE PROFESSOR at the MIT Media Lab, where she started the software agents effort seven years ago.

I'm not necessarily trying to make agents more intelligent. It's important that people can expect from their agent. Expectations need to be set correctly, and it's easier to do that if the agents are simpler. For example, take agents that buy and sell on behalf of people. Initially, we experimented with fairly sophisticated algorithms that would allow agents to determine the optimum price. But people didn't feel comfortable delegating that to an agent. So we've made it very straightforward.

In Kasbah [MIT's prototype agent-based electronic marketplace], you tell your agent what you want to sell, how long it should be on the market, the price you're willing to accept or offer. People trust that kind of agent because they know what its behavior will be like. Whenever we automate part of our lives, we lose something, possibly the ability to deal with that part of our lives ourselves. Agents aren't meant to completely automate all tasks. It's important that people still take responsibility.

Initially, I thought that software must take a larger and more active role in our lives to work on our behalf—to help make our lives easier, less complex, make more time for doing the things we enjoy. But since the advent of the Web,

I've started realizing that we don't always have to use software to augment ourselves. We can actually enlist the help of other people. You could almost argue that we don't have to build artificially intelligent computers anymore because the Net is our AI computer.

If I have a detailed question, I can just go to the right newsgroup and get the answer right away. This is the "communityware" idea—using computers and the Internet to help people help each other. And this will be especially true as more people are online.

#### THE PEOPLE CONNECTION

People can help other people, especially the underprivileged. For example, lots of people have been working on natural language translation systems with moderate success. But there are so many people in the world who speak more than one language. What if we could use the Internet to locate another person who could help with a particular translation: at a particular time?

Let's say I'm on vacation in Italy, that I'm shopping but don't speak Italian. I find something I really want to buy, and I need to talk with the merchant. I use my portable computing device to request that my agent go and find a human who can help me for five minutes, that I'm willing to spend \$5 a minute on this service, that the person's grasp of English needs to be modest, their reputation reasonable but not necessarily excellent.

So in a fraction of a second, my agent has negotiated with the agents of people who provide translation services and has gotten me the best deal available at the time. The translator calls or becomes available online, and we go from there.

There will be more opportunity to transform, really revolutionize, the transactions online. Software will help you decide

which merchant you are going to buy from, which products best fit your needs, and will help you negotiate the terms.

You could have software that monitors copier paper at the MIT Media Lab and decides when more is needed. The agent would go to an electronic exchange for copier paper and make choices based on the particular needs of the Media Lab. If the paper supply

is very low, maybe the agent would pay more for a supplier willing to deliver the next day.

We have identified a range of ways agents can make our lives easier. A lot of these ways correspond to things that people are just naturally not very good at—dealing with large quantities of information or remembering things. So agents can make a big difference. □

"AGENTS  
AREN'T  
MEANT TO  
AUTOMATE  
ALL TASKS.  
IT'S  
IMPORTANT  
THAT  
PEOPLE  
TAKE  
RESPONSIBILITY."

PATTIE  
MAES



# Objects *n*



**COMPUTER ASSOCIATES**  
Software superior by design.

© 1987 Computer Associates, Inc. All rights reserved. This is a registered trademark of Computer Associates, Inc. in the U.S. and other countries. All other trademarks are the property of their respective owners.

# Motion.

The future belongs to objects.

Jasmine is the future of objects.

It's the first complete and pure object solution.

It's not a hybrid. It's not hype.

Jasmine is real. A proven, complete object-oriented database and development environment. So now you can build the next generation of multimedia business applications and run them everywhere: client/server, Internet, intranet, and extranet.

## Introducing The Industry's First Multimedia, Internet-Enabled Object Database.

With built-in multimedia and Internet support, Jasmine has it all. A pure, object-oriented database. Drag-and-drop development environment. Distributed object delivery. Efficient database multimedia storage and manipulation, and efficient delivery through streaming and caching. The industry's easiest development environment lets you use all your favorite tools: built-in VB integration, native Java support, and C++ support.

Unlike hybrid or partial object solutions, Jasmine actually works.

So you can shorten your time to market and gain a distinct competitive advantage.

If that sounds good, pick up the phone right now. Because Jasmine is ready today.

Are you?



Call 1-888-7 JASMINE for your FREE Jasmine CD-ROM  
or visit [www.cal.com](http://www.cal.com)

# Introducing Jasmine

Objects @ Work

# Future So Bright

YOU'VE HEARD OF THINGS THAT GO BUMP IN THE NIGHT.

What about cyberthings that go bump on the Net? Salman A. Khan, 22, envisions a society in which cybersearch agents — personalized piles of code — will transact our business, serve as our proxies and possibly even live on when we pass.

*Khan was president of MIT's class of 1999 and now is a product manager for Oracle Corp.'s Oracle8 database. He also is co-founder of Ito.com, a start-up that seeks to promote the use of locally hosted domain names. Khan speaks with Computerworld senior writer Robert Lussner about his view of computers in the next 10 years.*

"[Physically] computers 10 years from now will probably not be all that different, and they are already getting cheaper to own. But what they will allow us to do will be altogether revolutionary. More than the physical computer, it's the global web of information that we know as the Internet that will really change our lives.

"The current World Wide Web is just scratching the surface in terms of the power of the Internet.

"Right now, we have only mapped conventional [tasks] to electronic ones. For example, you once went to an ATM to make a transaction from your bank account. Now you sit in your office and [conduct] the transaction [by accessing] your bank's Web site. You once went to the library to look up information. Now you do a Web search.

"What we will see over the next 10 years are new ways of transacting business and personal affairs and entirely new things to do over the Internet," Khan says.

"Everyone will be represented on the Internet by static data as well as dynamic processes — stuff that is far more extensive and powerful than information such as name, sex, race, age, interests and so on. This information could potentially be a nearly complete description of who you are and how you think.

"An analogy in today's terms would be your credit rating. It gives potential creditors an idea of the likelihood of your paying off your debts. Now imagine if that information were extended to represent your political views, your spending habits, who you spend your time with — not to mention a complete physical description of you."

That would allow for perfect marketing. "You wouldn't mind seeing ads, because they would be ads for things you were [already] thinking about buying and would probably [anticipate and answer] all the questions you have about the product."

Along the same line of reasoning, the data could be used to dynamically produce personalized text or video. "Imagine, for example, news that fits in any background information that you don't know, or a science text that is written at exactly your level of understanding.

"This concept of data representation can be extended even further to active data [for a software-based proxy] that could act on your behalf.

In 10 years, you may have agents that roam the Web and perform transactions as you would have performed them yourself. Since these agents would conceivably have your tastes and spending habits, they could conceivably try on and purchase clothing for you."

#### CAST A VOTE

That could extend to the voting booth, Khan says. "I definitely see a future for electronic voting. You can program [your proxy agent] to vote for you. For instance, you could say, 'Vote for the person who agrees with me on most of these points.' ... And then we'll get the turnouts we need [on Election Day]."

And Khan says he can imagine a person dying but having his or her agent live on in cyberspace. "It's a very interesting concept, that you and the information that defines you will become blurred," he says.

But that won't scare people away from their PC terminals or set-top boxes. "Of course, if all the dire threats about the millennium bug

come true, people may not have a choice but to turn away from their computers," Khan says with a laugh.

Khan also sees the development of megamergers — or megapoles — among those who provide content over the network and those who provide the infrastructure. Just as Microsoft and NBC created MSNBC, we'll see more media/computing conglomerates, he says.

He sees a big dogmatic shift in electronic commerce: the notion of micropayments. He says that if you're able to charge one-tenth of a penny in the virtual world, you can open up whole markets.

"For instance, you're a poet. You can sell your poem on the Web for one-tenth of a cent. People won't pay \$5 for a poem, but they'll pay less than a cent. There are things in the world that are worth less than a penny, but in the real world we don't pay attention to that because we can't charge less than a penny. [In the cyberrealm], you could conceivably have some 9-year-old who is the best Super Mario Brothers player, and he'll have a Web page and charge a half-cent to all the kids who want game tips and hit the site. And he could potentially be a millionaire."

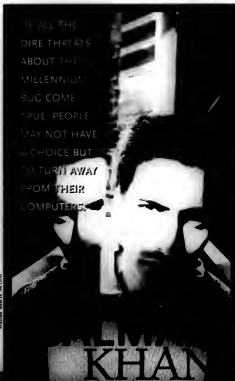
Digital watermarking would allow this paradigm to succeed. "The main argument against this model is that someone else could take [your] poem and stick it on their Web site and charge the same amount. But a digital watermark [or legal identifier] would track the information, and you could sue if that was the case."

Society must answer some very serious questions as to what the role of computers will be in our lives, Khan says.

"For example, there is a very fine line between utilizing the power of computing to benefit our lives and becoming so dependent on computers that we lose much of our humanity. The same technology which can be used to produce personalized information could be used by governments to bring about an Orwellian state.

"This issue — possibly the single most important issue ever — will start to show its face in about 10 years," Khan says.

And where will Khan be in the next decade? "Visionary consultant?" he asks with a chuckle. "I don't know, this could be the beginning." □



We're Up to the Future.

We've built  
our enterprise solution  
around **your  
business.**

So you can  
build your business  
around **your  
customers.**

Introducing  
**Platinum  
ERA.**



The first single-source truly integrated customer-centric enterprise solution scaled for your organization.

Platinum ERA delivers leading Enterprise Ready Applications to support your most important business relationship—the one with your customer. To find out more call (800) 997-7528 or visit us at [www.platsoft.com](http://www.platsoft.com).



Platinum® is a registered trademark and Platinum ERA is a trademark of Platinum Software Corporation. © Platinum Software Corporation 1996. All rights reserved.

# BILL GATES

"YOU WON'T EVEN THINK  
YOU'LL JUST KNOW THAT

## Pure Digital

In his 1995 book *The Road Ahead*, Microsoft Chairman and CEO Bill Gates forecast a future in which PCs are ubiquitous with data synchronized and available on all kinds of devices whenever we need it.

Although Gates' basic message has remained unchanged, the commercialization of the Internet has introduced a new variable, the potential of information technology to restructure many businesses.

When he sat down with *Computerworld* editor in chief Paul Giffin at the Comdex/Fall '98 trade show in Las Vegas in November, Gates' fundamental message was familiar: The best is yet to come.

People overestimate what will happen in two years and underestimate what will happen in 10.

As far as the PC is concerned, we haven't seen anything yet. In 10 years, it will be a small, tablet-like screen that you carry around. Or it'll be on the surface of your desk where you can see lots of documents. If we get it right, even the notion of filing things away as with a paper document will be antiquated. Today, even those of us who embrace technology still put a lot of things on paper. Eventually, hardware and software advances make everything digital.

There will be a variety of PC

form factors. Even the full-screen user will have a number of computers sharing data and connected to the Internet. You won't have to think about moving data around, your schedule and files will just show up.

Ten years from now, I believe that books and music and photos will have moved to pure digital form. The whole chain from the book author to the reader will become digital. People will be amazed when they have to use a paper form. They will take working through a screen for granted. I'll put my reputation on the line that this 10 years is when [paper forms will almost disappear].

There will be a device for

knowledge workers that will have an incredible processor that responds to you immediately. You'll take the device to meetings, and all the information you want will just be there.

You won't even think about where information really is. You'll just know that when you go to your home machine or your work machine, the files are there. The machine will be replicating information, and when you update it, the information will go up into a cloud and come down on other machines. Logically, the information will be in the cloud, but data will come to your machine, and the actual applications will be there.

Storage management will be invisible. The operating systems will do authentication and speech recognition and bring the files down. But you won't know where the server is.

The great debate is about which sectors of business will

# ABOUT WHERE INFORMATION IS. THE FILES ARE THERE."

be most transformed. Where does the advantage of broad price selection and comparison shopping of the Web outweigh the traditional personal contact in selling? Today, there are three selling worlds, face-to-face, phone and Web. The phone and the Web won't be separate in the future because you'll have the ability to talk to somebody from a Web site if you want to do a transaction. And they'll have the full context of what you're looking at and what your customer history is. Everybody will take that for granted.

But different goods will be affected at different rates. The way we shop for clothes may never change, but it'll be different because we'll have our measurements stored centrally, or we'll have hybrid pricing models. Books are a fascinating example. When I buy books occasionally, I do it online. But when I want to buy a whole bunch of books, I still go

to the bookstore. I like to run into things, scan the sections. That whole scanning activity is still weak on the computer.

[Electronic commerce gets overhyped today]. There's nothing dramatic about the fact that an order that used to come on paper now comes on the Internet. All you did was change the medium. What's profound is when buyers and sellers who never would have been matched before are being matched.

If I go to the car lot and I'm a lot smarter about what I'm buying as a result of doing research on the Internet, that wasn't an electronic transaction. But the whole dynamic was completely changed by the wide availability of electronic information.

Say you want to buy a novel gift. It's hard today. But what if I can find somebody on the Internet who helps find novel gifts for me, gets my criteria, sends back some suggestions,

and we go back and forth? The physical world doesn't do that very well.

Certain industries will restructure. The average company will become smaller, because the ability to work with outside partners will improve. You'll keep your core competencies in-house, but a lot of things will be outsourced. Your accountant, for example, will be able to come in electronically and see if you're doing things right. You might not choose to have an accountant in-house. But people who run restaurants, drill for oil or plant seeds — they'll still be there. Their value isn't affected that much.

In the computer industry, size and influence will be less correlated. Dell represents specialization. They use information to reduce inventory to a minimum. They are ideally suited to Internet commerce.

Ten years from now, there will be a leader in each cate-

ry of the computer industry, but there's no guarantee there will be the same companies.

The disparities between haves and have-nots [in society] are pretty dramatic and have been for hundreds of years. There is a chance to do far better than that. You'd like everybody to have access to these wonderful advances. But when you get outside the U.S., the priorities are a little different. You want to get people medicine and books and a phone. We can't stop progress and wait for everybody to catch up. And as computers create better crops and new medicines, they are creating better things for the whole planet, even though the tools take longer to get into everybody's hands. □

#### More online


For an extended version of this story, see our Web site at [www.computerworld.com/nxtdecade](http://www.computerworld.com/nxtdecade)

internet = catch

...ing captures more new business than a peak-performance Internet solution. HP Domain Internet goes even further. They're powerful enough to help you reach millions of prospective customers.







internet = hp

But they'll also help you trim costs by streamlining your business operations via the Net. And relax, we'll provide the security to keep out the sharks. For more information, visit [www.hp.com/go/enterprise](http://www.hp.com/go/enterprise).



# ANN WINBLAD

ANN WINBLAD ISN'T YOUR TYPICAL VENTURE CAPITALIST.

After founding two successful venture funds in the industry, she has done it all:

—launched a successful startup of her own, selling her own stock in

the company and working for the company.







THE FORTUNE 1000: GENERAL MOTORS 2 FORD MOTOR 3 EXXON  
 4 WALMART STORES 5 GENERAL ELECTRIC 6 INTERNATIONAL BUSINESS  
 MACHINES 7 CHRYSLER 8 MOBIL 9 PHILIP MORRIS 10 AT&T 11 BOEING 12  
 TEXACO 13 STATE FARM INSURANCE COS. 14 HEWLETT-PACKARD 15 E.I. DU  
 PONT DE NEMOURS 16 SEARS ROEBUCK 17 TRAVELERS GROUP 18  
 PRUDENTIAL COS. OF AMERICA 19 CHEVRON 20 PROCTER & GAMBLE 21  
 CITICORP 22 AMOCO 23 K MART 24 MERRILL LYNCH 25 J.C. PENNEY 26  
 AMERICAN INTERNATIONAL GROUP 27 CHASE MANHATTAN CORP. 28 BELL  
 ATLANTIC 29 MOTOROLA 30 TIAA-CREF 31 PERSICO 32 LOCKHEED MARTIN  
 33 FAYAT MAE 34 DAYTON HUDSON 35 MORGAN STANLEY DEAN WITTER  
 DISCOVER 36 KROGER 37 LUCENT TECHNOLOGIES 38 INTEL 39 ALLSTATE  
 40 SBC COMMUNICATIONS 41 UNITED TECHNOLOGIES 42 COMPAQ COMPUTER  
 43 METROPOLITAN LIFE INSURANCE 44 HOME DEPOT 45 CONAGRA 46 MERCK  
 47 BANK-AMERICA CORP. 48 GTE 49 JOHNSON & JOHNSON 50 SAFEWAY  
 51 WALT DISNEY 52 UNITED PARCEL SERVICE 53 COSTCO 54  
 FARMERSBANK CORP. 55 USX 56 BELL SOUTH 57 ENRON 58 INTERNATIONAL  
 PAPER 59 DOW 60 DOW CHEMICAL 61 SARA LEE 62 MCI COMMUNICATIONS  
 63 LOUISIANA 64 ATLANTIC RICHFIELD 65 AMERICAN STORES 66 CATERPILLAR  
 67 AXELERON LIFE INSURANCE 68 COCA-COLA 69 COLUMBIA/HCA  
 HEALTH CARE 70 AMR 71 AETNA 72 XEROX 73 AMERICAN EXPRESS 74  
 CATERPILLAR 75 UAL 76 RJR NABISCO HOLDINGS 77 LEHMAN  
 BROTHERS HOLDING 78 BRISTOL-MYERS SQUIBB 79 INGRAM MICRO 80  
 81 ARCEL 82 DUKANE ENERGY 83 FEDERATED DEPARTMENT  
 STORES 84 PHILLIPS PETROLEUM 85 PG&E CORP. 86 FLEMING 87 US WEST  
 88 METROPCS DATA SYSTEMS 89 MINNESOTA MINING & MFG. 90 SPRINT 91  
 CUMMINS 92 ALBERTSON'S 93 ALLIEDSIGNAL 94 SYSCO 95  
 FEDERAL HOME LOAN MORTGAGE 96 FIRST UNION CORP. 97 FLUOR 98  
 99 ARCHER DANIELS MIDLAND 100 RAYTHEON

## Why most of these companies let an eight-year-old work on their networks.

WHEN IT COMES to building and managing your complex networks, do what more than half the Fortune 1000 do: call International Network Services.

In just eight years, we've grown from a small startup into the leading provider of enterprise network consulting and software solutions, with over 1100 professionals dedicated to transforming networks into strategic business resources.

The reason for our success is simple: we treat each client's network as if it were our own. We have no vendor bias, our decisions are based solely on what's best for your business.

INS engineers have designed, implemented and operated thousands of complex networks. That experience—combined with our database of networking solutions,

the industry's largest—makes us uniquely qualified to design and implement an application-ready network that meets your specific business needs.

So put an 8-year-old to work on your network and see what a little youthful energy can do for your business.

(888) INS-8100 [www.ins.com/ad/cw](http://www.ins.com/ad/cw)



INTERNATIONAL  
 NETWORK  
 SERVICES

# Revolution in Waiting

LEWIS M. BRANSCOMB sits at the intersection — indeed, at the apex — of business, technology and public policy. At 72, he is professor emeritus of public policy and corporate management at Harvard University's Kennedy School of Government and director emeritus of the Science, Technology and Public Policy Program in the school's Center for Science and International Affairs. He also is principal investigator of the Harvard Information Infrastructure.

President Johnson named Branscomb to his Science Advisory Committee in 1964. Branscomb was a research physicist at the National Bureau of Standards and its director from 1969 to 1972. In 1972, he was named vice president and chief scientist at IBM. While at IBM, he was appointed by President Carter to the National Science Board and in 1986 was elected its chairman. He is a member of the National Academies of Engineering, the National Academy of Sciences and the National Academy of Public Administration. *Computerworld* senior editor Gary H. Anthes spoke with Branscomb about the next 10 years of computing.

**CW:** What changes are on the computing horizon?

**BRANSCOMB:** A lot of the changes will be unseen and as pedestrian as they are profound. Automobiles, already stuffed with computers, will be self-navigating, nonpolluting, and collision-avoiding. Homes will have smart electrical systems that control the production and use of power, integrating the power-generating capacities of our uses into a single cogeneration facility that exchanges power with both neighbors and the public utility. Smart, noninvasive health-monitoring systems will bring telemedicine to the family, avoiding expensive institutional health services by shifting expenses from the cure of disease to home-based health maintenance.

**CW:** How about the manner of communications?

**BRANSCOMB:** Computer communications has been around some 30 years, but for most of that time the speed with which information could be exchanged was so much slower than the internal speeds of processors that one could not realize the benefits of fully distributed intelligence. I once compared the linking of two computers over a phone line to two people trying to make love through the medium of the post office. But we will not have to wait 10 years for the disappearance of modems and their replacement by all-digital LANs in homes and offices, giving every computer access to at least Ethernet speeds.

Once high-speed communications is widely available, truly

distributed computing becomes practical. Some kinds of information will be easier and more accurately obtained by acquiring it in real time rather than relying on periodic data gathering and storage in files that get progressively more out of date. When the city planners want an accurate city map with all building locations, they may acquire and process the image of the city from a satellite rather than relying on municipal records replete with human error.

**CW:** How will these technologies change our lives?

**BRANSCOMB:** That depends more on political and social priorities and the effectiveness of institutions than on the technology. Government agencies could today provide each citizen full access to their records so they could verify them. But most agencies don't. Stores

could make it as easy to buy a washing machine online as it is to buy a book. But most don't. None of this requires any new technology whatsoever. It only requires institutions to understand what their responsibilities and opportunities are and react correctly rather than defensively.

Education is the most challenging and important sphere for IT. But the effective use of computer communications in schools cannot happen unless the schools are reinvented and teachers have better training, more respect, more authority.

**CW:** Are there barriers to the progress you're describing?

**BRANSCOMB:** The most ardent conservatives violate their own principles by searching for ways for the government to intrude on private lives. Their motives

are respectable: shielding children from shocking material, discouraging the diffusion of information useful to terrorists and drug addicts, allowing police to warrant computers when they get a warrant to do so. But balancing the government's two primary duties — to protect our liberties from government abuse while using government power to protect our safety and security — has never been easy in a democracy.

**CW:** Will we get better at developing software?

**BRANSCOMB:** The financial incentives for technological progress have shifted from hardware to software. New ideas in software component technology are emerging — a variety of ideas stemming out of the object-oriented programming world, such as [Common Object Request Broker Architecture], Java-based ideas and others. I expect this to be a fruitful area of invention in the next five years, with some real payoffs within the next 10. When we achieve the dream of object-oriented software, the revolution will have arrived.

**CW:** Any risks in technology?

**BRANSCOMB:** If IT is used in trying to get even higher efficiency, there will be growing

risk of catastrophe. Even tactics aimed at greater efficiency do so at the risk of more drastic, if less probable, instability. Ecologists learned this long ago: Replacing 75,000 natural varieties of rice or wheat with a dozen genetically optimized species increases production drastically, but if a new plant disease hits one or two of these new species, the world may lose 10% of its food supply.

One of the most serious questions facing government today is how to decrease the vulnerability of today's economic infrastructure: transportation, communications, power production, delivery of health and business services. All are increasingly based on IT.

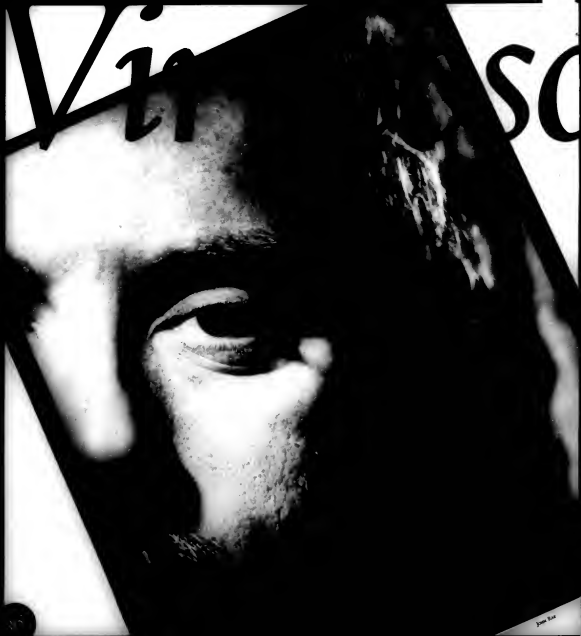
**CW:** So it can be a threat. Can it also be a solution?

**BRANSCOMB:** IT is the one tool available to human society to permit us to design our socioeconomic systems so they are resilient against potential catastrophic change. Maximizing one dimension in a complex system is a relatively easy analytical problem. But understanding the dynamics of complex systems — whether ecological or socioeconomic — requires dealing with systems that are chaotic, nonlinear and often irreversible. □

"I ONCE COMPARED THE LINKING OF TWO COMPUTERS OVER A PHONE LINE TO TWO PEOPLE TRYING TO MAKE LOVE THROUGH THE MEDIUM OF THE POST OFFICE."

# LEWIS BRANSCOMB

"WE'LL SEE A CULTURE OF KIDS DOING PRETTY RADICAL THINGS WITH WIRELESS DEVICES, [INCLUDING] HAVING THEM EMBEDDED IN THEIR BODIES."





# JARON LANIER

**MOST CONSIDER HIM TO BE THE FATHER OF VIRTUAL REALITY.** Before his 34th birthday, Jaron Lanier had invented the dataglove and the eyephone. Now 38, he's likely to be found consulting to a Fortune 500 company or jamming with musicians (in virtual reality, of course). Lanier now serves as the lead scientist at the National Tele-immersion Initiative, a coalition of research universities studying advanced applications for Internet 2. Sun Microsystems Inc. recently acquired Lanier's portfolio of patents related to virtual reality and networked three-dimensional graphics. Lanier talked with *Computerworld* senior editor Barb Cole-Gomolski about what the next 10 years of computing will be like in the real world.

**CW: What role will computers play in our home and at work?**

**LANIER:** I think the big transformation in the role of computers is going to be that they will move from being a personal tool to an interpersonal tool. We see that already with E-mail and E-commerce. But we'll see it on a more profound level. Really intimate and personal aspects of people's lives will happen over the medium. Parents and children will be able to stay in touch in a way that is not possible today. The heart of this [issue] is not technological. It's more about how humans will behave when they have new options.

**CW: What will computers look like? What will the PC of the future resemble?**

**LANIER:** I'm predicting a lot less innovation than I'd like there to be. We're talking monitor and a keyboard as an input device. It's a legacy system, and we're stuck with it. I don't see pen-based [models], except in niches. Voice recognition will be standard. Clearly, there'll be a camera, and it won't just be used for videoconferencing. It will be used to confirm the identity of the user and monitor job performance.

We'll see a culture of kids doing pretty radical things with wireless devices, [including] having them embedded in their bodies. There are some other dark horses, things like interfaces in automobiles. In

terms of mainstream use, the most convenient device might be some little display that's near your eye and some kind of device that rests on your chest. The other big area will be the convergence of computers, phones and TVs. From the business perspective, the really big issue will be cost management. I think we're going to see a lot of pressure not so much on the cost of computer equipment, but on the overall true cost [to run it].

**CW: How will we interact with our computers? What will interfaces look like?**

**LANIER:** I hate to say it, but unless something happens to Microsoft, they'll look the way Microsoft wants [them] to. I don't think they're very good at user interfaces. It will have to keep changing somewhat, so they can get people to buy upgrades. [Microsoft] seems to have a penchant for these little animated figures that treat the user like a moron. I would expect to see a lot of these really dumb, smiley-face interfaces that patronize the user.

In terms of wireless devices, there's a lot of hope for interesting user interfaces. For instance, every conceivable surface could be a display. Instead of putting up wallpaper, you put in a display. Instead of putting down a rug, you put down a display. I think virtual reality will play a role in many ways. We'll see more [of it]

in business applications.

**CW: What will the Internet be used for?**

**LANIER:** That's like asking what will water be used for. It should be thought of much more broadly. Water is used in a million ways. I think that's how the Internet will be a general-purpose utility provided by public and private means. It will become very cheap.

**CW: How will computing change our concepts of community? Of workplace? How important will computers be to finance and government in 10 years?**

**LANIER:** Society will be revealed to a much greater extent. In its worst face, it's a lack of discretion. At its best, it's an increase in honesty. People know how to lie before the Net. The Internet is a technology. I'm an optimist, so I believe that while the Internet allows people to do more things, there will be more jerks. There will be more pedophiles and pyramid schemes — but also more good. We'll see a more visual Internet, where we are looking at someone's face. We will vote on the Net, but we won't be the first country to do so.

**CW: How will computers affect the way we transact business with customers and business partners? What new applications haven't been developed yet?**

**LANIER:** For one thing, I think we've been in an era of data-

mining as a paradigm. We create databases of customers, target and sell to them. The new hot commodities are portals and databases. I predict that those things won't meet expectations. What will emerge is a more subtle and superior model of how IS can improve customer relationships. Rather than targeting the customer, they should turn them [Web site] into a video game that the customer wants to play. If businesses do this, they will make more money.

As far as business to business, there will be more and more recognition that in order for IT systems to be successful they have to be built around specific people. The really high-performance systems — like one for a fighter pilot — are built this way. Today, businesses are designed around IT. I think you'll see an IT environment specific to [human resources] and one that is specific to quality control. It will be much more human-centric. Wealth is created by people, not computers.

**CW: How much computing power will \$500 buy in 10 years?**

**LANIER:** Right now, for \$500, you can buy a Nintendo 64, an incredibly impressive computer. In 10 years, you will probably be able to buy something utterly stupendous. But that doesn't excite me if all it does is run the same software a million times faster. □

THEY TRANSFORMED INDUSTRIES AND MADE BUSINESS HISTORY.

**MIKE HESCHEL,**  
57, put the pioneering ASAP ordering system in his customers' hands as CIO at American Hospital Supply and made waves as it knocked out the competition. He now works in Cincinnati as executive vice president of information systems and corporate services at supermarket chain Kroger Co.

**CHARLIE FELD**  
showed how salespeople armed with handheld computers could streamline the sales process and create marketing data. That was when he was vice president of IS at Prito-Lay Inc. in the 1980s. Now, at 56, Feld is CIO at Delta Air Lines and president of Feld Group, a CIO-for-hire company.

# Trail

**MAX D. HOPPER**  
revolutionized the airline industry by developing American Airlines' Sabre reservation system. Then he turned that system into a business as chairman of Sabre Group before retiring in 1995. Now 64, he consults out of Dallas.



# Blazers

## WE ASKED THESE THREE LEGENDARY CIOs

how companies can use technology to compete in the next 10 years and what the next decade will mean for information technology. Allan E. Alter, *Computerworld's* department editor, Managing, led the discussion and prepared this edited version of the conversation.

**CW:** How can companies use the Internet to achieve sustained growth and profitability?

**HESCHEL:** You have to view the Internet as a networking capability that gets you anywhere, anytime. What do you want to make available so you can offer services that enhance your business relationships and drive sales?

**HOPPER:** We have a fairly primitive form of the Internet now. As the bandwidth comes along to make it work well, it's going to supplant an awful lot of how the world works today. For example, people like Mike will move to revenue maximization techniques such as flexible pricing. The Internet will become a distribution channel for almost any merchandise.

**FELD:** We see it in the airline business. It's part of the strategy to reach more people for travel services. My kids are in their late 20s and early 30s, and they live on the Net. They wouldn't think of buying a ticket any other way. The combination of improving technology and the next generation's purchasing power is tremendously powerful. As the Net matures and 25-year-olds become 20-year-olds and start spending money, it'll be huge.

**CW:** How will IT leadership change?

**FELD:** IT leadership will include not just CIOs or their direct reports, but the CEO and his direct reports. The whole human side of IT will have to change because the development cycle is too long. That will push us to more cooperative work, more partnerships and quicker ways to get things done.

**HESCHEL:** The CIO will have to

have much faster cycle development times, to get visibly quicker results. What's critical is to take key performance indicators—sales and inventory levels, bottom line, employee turnover—tie them to the systems you have or are developing and communicate those results to the business partners.

**HOPPER:** The CIO of the future has got to be a leader. It will take real understanding of business processes and information technology to be a real effective CIO.

We're going to have more packaged solutions than today. We've gone partway with the SAPs and IISs and others, but we will go much further. In most industries, there will be one or more standard solutions for most problems. The amount of custom development will continue to diminish.

**CW:** What about the IS organization? What will it look like?

**HESCHEL:** It will change dramatically. IS will continue to manage a large central database because you have to have consistency across the company. I see that continuing indefinitely. Where I see the real change coming is with the kids coming out of school now. They're able to use a PC and do things with that information to make decisions. So I see fewer centralized programming-type people required to generate reports for them.

I see more business savvy in the analysts in order to understand the requirements. I see leaner organizations, but more money spent on information-based capabilities—intranets and extranets of all types,

companies sharing information.

**FELD:** I'll echo the central database. The No. 1 charter of an IS organization of the future is managing data in an enterprise fashion.

**HOPPER:** We're continuing to see technology solving technologists' problems, but in many ways, we've been the cobbler's children, putting technology out there without knowing how to manage it. We're moving to a world where IS folks will be facilitators and businesspeople who understand the tools to choose from to solve problems.

**CW:** How will we interact with our computers?

**HESCHEL:** I see a tremendous growth in voice-activated commands. We'll see a heck of a lot easier ways to use PCs. More graphics, more touching images to get things accomplished. We're experimenting with using fingerprint-recognition technology to interact with financial services institutions. That seems to be working very well.

Computing in households or by individuals will become more like a utility or the telephone. You pay for what you use, and it will be fairly easy to use it.

**HOPPER:** Computing will be far more proactive than reactive. We will have smart devices that will be attuned to doing things for us. Voice is going to be important, but we are going to have a host of interactive, full-bandwidth visualizations—for example, the ability to preview a trip before you take it.

**FELD:** People work in different ways. I will be able to get the technology to profile how I want to run my business or look at things and then do it my way instead of the machine's way.

**CW:** What lessons have you learned

from building some of the legendary systems in technology that will apply to the next decade of IS? What advice do you have for people trying to use technology for competitive advantage?

**FELD:** Companies need to keep investing and renewing the systems that may have been legendary to 15 years ago and not just ride them. We're still looking at a lot of Max's code in the airline business 20 years later, while both the business and technology have changed dramatically during that same period.

**HOPPER:** I agree with Charlie that continuous investment is key. One aspect is how it gets reinvested. Too often it gets reinvested with minor upgrades. In some cases, you have to do a big replacement investment.

You asked about seeing strategic advantage. I don't think that's a worthy objective. I'm not convinced you can use technology to create sustainable competitive advantage. That comes from being better in the business you are in, which means marrying technology and business in a joint solution.

**HESCHEL:** At American Hospital Supply, we didn't say "Objective: Sustainable competitive advantage." It was a customer-service orientation: we were providing customers something they would like and want. You approach that today by picking your most important business processes, looking at them and seeing how technology can help. Wal-Mart took the most important pieces of its supply-chain process and used technology to make them much more efficient and drive down costs. This also can be accomplished with customers.

### More online

For audio and an extended version of this story, see our Web site at [www.computerworld.com/nextdecade](http://www.computerworld.com/nextdecade).

**CW:** OK, it's the next decade. Looking at the past 20 years, who were the big winners and losers?

**HESCHEL:** Certainly Microsoft and Intel. I think IBM will be a major player. I worry about some of the elder guys—Unisys, NCR and so forth. I don't think what role they'll play, although I am sure there will be one. If you're not an information-based firm, you'll be gobbled up. □

"WE'RE CONTINUING TO SEE TECHNOLOGY SOLVING TECHNOLOGISTS' PROBLEMS. . . WE'VE BEEN THE COBBLER'S CHILDREN, PUTTING TECHNOLOGY OUT THERE WITHOUT KNOWING HOW TO MANAGE IT." — MAX D. HOPPER



**REAL SOLUTIONS. REAL BENEFITS. REAL TIME**

The DataGate<sup>®</sup> product suite, with over 1,200 installations worldwide, is the most respected Enterprise Application Integration (EAI) solution on the planet. Integrating over 15,000 applications, the power and versatility of DataGate are unmatched.

In today's rapidly evolving business environment, STC's solutions show that EAI technology can provide the strategic advantage that can significantly reduce costs, decrease time to market, and improve responsiveness to customers. Growth and market changes can strain your company's IT architecture to the breaking point. Mergers and acquisitions only complicate the problem, bringing a flood of new and old systems that must be preserved, enhanced, and maintained.

What you need is a comprehensive EAI solution that allows you to connect the pieces of the distributed computing puzzle according to a flexible, well architected plan. You must have a solution that compiles data from multiple sites and eliminates redundant storage and data entry. The solution must address your existing systems in a consistent way and lay the foundation for real-time integration of your company's core value chains.

**Proven Return On Integration™**  
**800.425.0541**

**STC** SOFTWARE  
TECHNOLOGIES  
CORPORATION

**[www.stc.com/cw](http://www.stc.com/cw)**

© 1998 DataGate is a registered trademark. The STC logo and Proven Return On Integration are trademarks of Software Technologies Corporation.

# Appliance Reliance

IN A SENSE, THE FUTURE OF COMPUTING IS NOT COMPUTERS, according to Joel Birnbaum, senior vice president of research and development at Hewlett-Packard Co. and director of HP Laboratories.

*It is the need to learn a singular technology and problem set in the form of easy-to-use devices with specific uses and simple interfaces that holds the technology advance technology, he says. Birnbaum has imagined a world of such information appliances since the '70s.*

Some information appliances will work on their own, but most will do most their capabilities from information utilities distributed and powerful network-based services with the reliability of today's power and telecommunications utilities. General-purpose desktops and laptops will continue to evolve but broadening the horizon of technology in the coming decade will be specialized appliances in which computing is done in the background.

In an interview with *Computerworld* staff writer David Greenstein, Birnbaum explains how information appliances will become a pervasive mode of computing.

For a long time, I've kind of believed that the great mass of computing is going to be done by specialized devices that are intuitive to use. You can learn a device in terms of the function it performs, just as you can learn to use a vacuum cleaner or a VCR or CD player. Most of the computers in the world will be embedded computers.

There are two key questions here. One is, Can you make them intuitive to use? That is, can you make a computer as easy to interact with as the common use of consumer appliances? If you answer that question positively then the second one is, Would anybody care?

My view of the computer of the future is that it is more personal, more idiosyncratic, less obviously a computer device than it is something that does a job that people want to do. It will have things that are inside

it that people use intuitively and that they don't worry about how they work.

In the next to years... bandwidth costs will be so low. There will be a set of opportunities to put in very rich user interfaces that will make computing available to those people who are not computer people without [those people] having to bear the cost of the device itself. In other words, if the bandwidth is great enough, the computation can be done by the network rather than a device, or at least some part of it can be done.

Computers will get very specialized. A class of servers will emerge on the network, which will be as specialized in their way as these appliances are.

So what does the utility look like? I have been thinking about

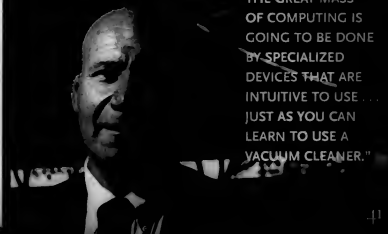
that probably since about 1975 or 1976. The utility itself hides the operating system. You might have five different service providers, and they might have written their things at different times in different ways. You, the user, want to see a consistent user interface. That lets you run it on different kinds of machines, run it from different places, and in particular it lets you add resources when you need them and pay for them only as you use them. It builds on top of all the information and communications capabilities of the Web, but it adds services and computation where appropriate.

Frankly, about five or six years ago, I stopped talking about the information utility. I stopped really believing in it. I was, real-

ly, I would say, in quite a bit of despair. And then the miracles occurred. One was the Web. And then the second miracle was... the geistes did Mosaic. The notion of a browser, which was point-and-click, suddenly made it accessible to everybody.

I think [information appliances and utilities] create huge opportunities, which is not to say that the current players are going to go away. I think a lot of the value-added and profit is going to come from the services that are added to the network and not the core hardware platforms. I don't think any of us—the traditional hardware systems manufacturers—are going to be very successful unless we change our business models dramatically. The rise and fall of companies will be very great. □

## JOEL BIRNBAUM



"THE GREAT MASS OF COMPUTING IS GOING TO BE DONE BY SPECIALIZED DEVICES THAT ARE INTUITIVE TO USE... JUST AS YOU CAN LEARN TO USE A VACUUM CLEANER."

# "INFORMATION SECURITY WILL BE LIKE THE OLD WEST. LAW ENFORCEMENT WILL ASSUME THE WYATT EARP ROLE TO COMBAT THESE JESSE JAMES-STYLE CYBERCROOKS."

ON HIS 17TH BIRTHDAY, MARK GEMBICKI STARTED work at the National Security Agency's (NSA) Research and Development unit – plucked out of high school after testing off the charts in electronics and computer science.

In 1987, Gembicki helped form InfoTek Systems Inc., which produced technology now used in cable boxes. His current venture, Warroom Research Inc. in Annapolis, Md., is a consulting firm that performs penetration tests on firewalls. "When CEOs and CIOs appear on TV telling reporters their networks have never been hit," says Gembicki, now 33, "we're getting the truth from their security administrators."

This is Gembicki's story, as told to Giga Information Group analyst Laura DiDio, a former senior editor at Computerworld.

I joined the NSA when I was 17, in 1968. That coincided with the release of the movie *War Games*, which gave the public its first look at a teenage hacker who made the old guard sit up and take notice that, hey, they may have pimples on their faces, but we'd better listen to their ideas.

I didn't know until after I got to the NSA that it dwarfs the CIA and all other U.S. intelligence agencies. There was a book out then called *The Puzzle Palace*. People would say to each other, "Has your name popped up [in the book] yet?" "No, but I'm in the index." So I knew I was working for some pretty powerful guys.

The NSA hired me primarily because I had a propensity for hardware and electronics, so I

got to work on a bunch of very interesting programs. I found out a few years ago that one of the programs I worked on back in the early 1980s grew into something called the STU [Secure Transmission Unit], which evolved into the overall secure communications infrastructure that's now used throughout the world.

Ten years from now, there will be two Internets. One will be designed strictly for research and consumers. It will have the same level of security we see today, which is fair-to-middling.

The second Internet will be deployed by banks and other core infrastructures [such as] the telecommunications industry. This will be used for true electronic commerce and sensitive transactions such as technology transfers.

The future of information security will be like a return to the Old West. Law enforcement will have to assume the Wyatt Earp role to combat these anarchic, Jesse James-style cybercrooks. We're going to have to empower our law enforcement agencies with a lot more latitude to quickly investigate and prosecute elusive cybercrooks, who often get away because of the borderless Internet.

Americans are too dependent on information technology. We're not stopping to con-

sider the ramifications of being so digitally dependent, which is the point that Cliff Stoll made in his book *Silicon Snake Oil*.

Going forward, we won't have scattered, random computer crime. We'll see much more orchestrated attacks. It won't be 15- or 18-year-old perpetrators. The hacks of the future will be driven by cybercartels—which are forming even now.

We're starting to see a portent of things to come. In September, for example, the Department of Defense acknowledged that computer networks at multiple government facilities were attacked simultaneously. The only way that could have happened was if a unified group was acting in concert.

The fallout of the U.S.'s overreliance on information systems will be a loss of our competitive edge. We focus too much on making the information look pretty instead of determining what value the data actually holds and how to secure it.

I think, believe it or not, the Europeans will take the lead in IT, and the Japanese will be the dominant force in computer hardware. American firms will retain their edge in software. U.S. firms, by their own admission, get hacked over 20 times more than foreign firms.

That's because of our own societal arrogance; we don't believe our systems can be penetrated.

In the next 10 years, the entertainment, telecommunications and computer companies will compete for ownership of the information pipeline into our homes and briefcases. Companies that survive will dominate. Firms that create highly usable products will dominate. I think Cisco Systems will have a hand in all information security companies. They have the hardware resources and a distribution channel unlike any other company.

## ACHILLES' HEEL

Computer security will continue to be our Achilles' heel. The U.S.'s critical infrastructures, which include government, communications, airlines, water, oil, utilities and the defense grid, are all terribly at risk.

The petroleum industry will be the biggest target, for two reasons. First, we've got discontented environmental factions. Second, the security councils of the petroleum industry are not doing what they should to interface and cooperate with law enforcement and government to minimize vulnerabilities.

Most people look for obvious computer-based attacks launched against the petroleum industry wouldn't necessarily result in oil spills. But they could have an even more insidious catastrophe, such as hackers altering logistical data on a massive scale to affect the barrel price of oil. This could put countries into an immediate recession. Or it could trigger a panic reminiscent of the gas shortages of the 1970s.

The scary truth is that the cybercrooks and the emerging cybercartels are much more organized and motivated than American industry and law enforcement.

Without close cooperation between the latter two, we're doomed. By the year 2000, I think we'll see a major infrastructure attack that leads the nightly news. The odds are good that either the petroleum or the medical/health care [industries] will be the first to suffer a pervasive hack. Going forward, we can expect the medical community networks to suffer significant invasions of privacy.

The bottom line is, we should not worry about building bigger, faster and better information systems. We should address the real challenge: building more effective systems that are designed to be secure. □



# FutureTense

JANUARY 4, 1999 THE NEXT DECADE COMPUTERSWORLD

# WHAT DOES IT TAKE TO MAKE SOFTWARE DEVELOPMENT MORE PRODUCTIVE?

**Computerworld  
finds that users  
prefer StarTeam  
collaborative  
development  
from StarBase.**

In their April 6, 1998 issue, Computerworld asked StarTeam users and version control software users to discuss product capabilities and potential. The results speak for themselves:

- "I got more done in one day with StarTeam than I did in two weeks with the other products we evaluated."
- "Part of StarTeam's beauty is that all of its functions are integrated under one interface."
- "As more nondevelopers take integral roles in the development life cycle, ease of use becomes critical...The makers of StarTeam know this, and it shows in the interface, users say."

StarTeam encourages collaboration with features such as **Location Transparency**, so team members can access any type of file, from wherever they are. Use our Windows client, our Java client or your browser across LANs, WANs, the Web or the Internet. **Visual Configurations** eliminate the error-prone, time-consuming

## You gotta have teamwork

Eight years of two different types of team development/configuration management tools report: The products have some challenges but are essential to a smooth development process.

By John H. ...

**G**...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

process of using labels. **Generalized Linking** lets you link all the items in your repository in any number of ways to preserve context. Our **File Management Interface** preserves the structure of your projects. And our integrated **Defect Management** and **Threaded Conversations** capabilities dramatically increase your team's productivity.

For current users of version control software, StarTeam provides a **Collaborative Framework** that interoperates transparently with PVCS, Visual SourceSafe or StarBase Versions™ archives. So now you can build

Team Productivity on top of what you already have.

But don't take our word for it. Call us today at **888.STAR700** or visit **www.starbase.com** and we'll send you a reprint of the complete Computerworld article. Because when it comes to collaborative development, we let our users speak for themselves.



**StarBase®**

THE FUTURE OF TEAM PRODUCTIVITY IS HERE.



# Net Essentials

LARRY ELLISON ARRIVES FRESH FROM A SPEECH to the clubby Agenda '99 conference in Scottsdale, Ariz. The speech is by now a familiar one: In the future, PCs will be replaced by Internet appliances, and software will be written for the Internet rather than the desktop. That message is increasingly hitting home with high-tech executives who fear Microsoft and want to savor the riches of Internet commerce. In an interview with *Computerworld* editor in chief Paul Gillin, Ellison expounds on his ideas.

**CW: What will be the biggest impact of information technology we'll see in our day-to-day lives in the next 10 years?**

**ELLISON:** The Internet will go mobile. You will be connected in a car, at the beach, in a tunnel, in an airplane. You will always be connected to the Net. It'll be interesting, because if people want to get to you, they'll be able to, if you let them. It's going to make us more efficient. And distracted.

**CW: What will computers look like?**

**ELLISON:** The model will be an appliance. It won't be this ridiculous distributed concept we have now. On Star Trek, you don't see Spock or Scotty carrying around computers.

Data will be stored in centralized servers because that's the safest and most economical way to store it. You'll carry around a portable device, but you'll periodically plug it in to recharge the batteries and get the latest applications and save your data. It'll be as simple as plugging one cord in for electrons to recharge your battery and another for bits to move your data on to a professionally managed server, where it's safe and secure.

Internet computing will be with us virtually unchanged as a model, with applications and data on servers accessed through a network. It takes the computer network to the point where it resembles all other

essential networks in the world. Look at the telephone network: It uses a very simple appliance with professionally managed complexity. The network itself is very complex, but the end user sees none of that. The same thing is true of the television network. It's enormously complex, but everyone has a relatively simple device to use it. The computing model with the Internet suddenly looks exactly like that.

**CW: Does that mean we'll have fewer servers?**

**ELLISON:** I don't think Burger King wants a little database in every hamburger stand. I think they want a unified database so they can drill down and look at

what's going on inside one restaurant.

We'll have vastly more power but fewer discrete servers. The problem is that the labor associated with a little server and a big server is about the same. So if we can consolidate to a smaller number of servers, we're better off.

**CW: What will be the dominant business and home apps?**

**ELLISON:** I think you'll see a consolidation of fragmented [back-office] systems to global systems. This concept of national or office systems will disappear.

We'll also move out of the back office and more aggressively into the front office. We're going to record every interaction with our customers in a database. We'll know much more about our customers on a global basis.

Your home will have little networks, but your data will not be stored in the house. You'll have big storage farms, and you'll buy some network service that will store it for you — guarantee backup and security.

**CW: Will the disparity between the haves and have-nots widen?**

**ELLISON:** It improves over time for two reasons. One is that the cost of computing will go down. And you'll have free services available on the Internet for not much money.

The online service will be almost given away. Like a broadcast TV model, there'll be such a surplus of network capacity that the network companies will give away basic network services and pay for it with advertising.

**CW: What does the operating system of 10 years from now look like?**

**ELLISON:** Andy Grove recently said the operating system will become anonymous. Today, people write programs to run on Windows. In the future, those programs will run on the Internet. It doesn't make any difference what the operating system is.

**CW: How about the computer industry power structure?**

**ELLISON:** The dynamics of competition on the Internet will make it impossible for any one company to dominate. You really will have just what Bill Gates says he wants — you really will have innovation. □

ON  
STAR TREK,  
YOU DON'T  
SEE SPOCK  
OR SCOTTY  
CARRYING  
AROUND  
COMPUTERS."

# LARRY ELLISON

# Forté On OS/390 Sets LAN Speed Record

2.5 Million Transactions Per Hour\*  
WITH *0.03-second* RESPONSE TIME



Forté and IBM are proud to announce a major benchmarking event: 2.5 million transactions per hour. Forté, the world's acknowledged ultimate development and integration technology, will now automatically scale, load balance and integrate across all major platforms, from your desktops all the way through to the IBM S/390. Which means big-iron server consolidation, maximum server scalability and seamless legacy-system integration with new applications is now a reality. In other words, anything you need to do — from integrating legacy applications with best-of-breed suites to total redevelopment — can be accomplished before Y2K arrives. Contact Forté for a copy of the S/390 benchmark white paper. Let us show you how simple your problems have become.



**FORTÉ**  
MEANS CUSTOMER SUCCESS™  
[www.forte.com/ads/cu17](http://www.forte.com/ads/cu17)

Call 800-622-5076 (or 510-869-3400 from outside the U.S.)

©1996 Forté Software, Inc. Forté is a registered trademark of Forté Software, Inc. All other trademarks acknowledged. \*IBM  
2,500,000 transactions per hour, 70% test, with 1000 & 2000 concurrent users. These measurements were done in a customer benchmark of Forté on OS/390 version 2.5 using IBM System/390.

# The Calm After the Storm

MOST PEOPLE KNOW JOHN SEELY BROWN AS THE chief scientist at Xerox Corp. and director of its Palo Alto Research Center (PARC), birthplace to technologies such as graphical user interfaces, and object-oriented languages. But he's also the founder of PARC's cognitive science research group — a specialty that becomes apparent when he talks about the future. In an interview with *Computerworld* senior editor Anne McCrory, Seely Brown forms his vision of the next 10 years of computing by the way the human mind works and what technology has to learn from it:

Think about your drive into work this morning: navigating the traffic, seeing the road signs, checking your speed and mirrors, listening to the news, humming a tune, drinking your coffee, remembering your co-worker's birthday today. All that, speeding along at 65 mph, and yet the moment that the squirrel darted into the road, you slammed on the brakes.

It wasn't your computerized antilock braking system that saved you. It was your mind. It offset through the 10,000 stimuli coming at you to recognize the one you really needed to know about at that moment. That's what the computers of the future will let you do.

That's what we here at Xerox PARC call ubiquitous, or calm, computing — computers with seamless interfaces. It's a completely different concept from what we have today, as we grapple with intrusive devices — pop-up E-mails, phones ringing — and too much information we don't need. We've increased our tunnel vision but decreased our ability to become attuned to things happening around us in a subconscious way. That's one reason everyone is so frazzled. So what excites me as we move forward is that technology is finally getting powerful enough to get out of the way.

These seamless interfaces will become critical as we adapt to the coming Information Age and a global economy that will be based not on making products, but on making sense of the world around us. Success-

ful companies will outsource their manufacturing and instead spend their time identifying new niches and new needs and devising and marketing products to fill them. The only sustainable edge a business has is to learn faster than its competitor. And to do that, it needs to share knowledge within the firm, to interpret and make sense of the world faster than others.

Companies can't do that without the creativity and collaboration of their people. And systems must help. They should help us communicate as efficiently, as subtly, as effec-

tively with our colleagues in distant offices as with our colleagues who sit one desk away. They should help us learn from each other and find ways to store that knowledge where others can easily find it. I don't mean knowledge management as it's known today: that's information management — indexing and retrieving documents. In the future, we'll have not 10,000 documents but zillions, and we'll need robust architectures that can handle that volume as well as link thousands of components dynamically together. We will also need systems that think and even repair themselves.

This is where organic E-systems come in.

That's right: organic systems. We will bring the worlds of material science and computing together by building smart matter — inorganic components with the almost biological properties of self-diagnosis and repair. These components may even be microscopic, and they will be able to perform physical feats very accurately on a very small scale. Take high-speed color printers. They require accurate registration of the image as it is generated four times. Using microscopic pieces of silicon that act as cilia, the printer could adjust the paper even just a micron so that all the colors

would line up. Thus, we have a moving surface without any visible moving parts. This will enable us to build whole new classes of appliances.

Meanwhile, we will find ways to capture knowledge as it is created, establish a way to find it again later and then communicate it. A video of a meeting or diagrams drawn on a whiteboard could be automatically summarized and indexed, with a software agent going out to alert people who need or want to view it. Everything — copiers, fax machines, the office coffee pot — will be connected to the Internet.

I will feel like I'm connected to all kinds of people and be aware of what they're up to without having to focus on it, the way I know to ask a colleague a question when he swivels around in his chair or to swerve around trash in the road when I'm driving and deep in thought. I call these new environments "information fabrics," and they'll accelerate our ability to learn by filtering out all the noise we deal with today. Will this all happen in 10 years? Some of it will start to happen in three and certainly will be here in 10. Our only limits are thinking that's trapped by the computing conventions we are so used to. And our imagination. □

"TECHNOLOGY  
IS FINALLY GET-  
TING POWERFUL  
ENOUGH TO GET  
OUT OF THE WAY."

JOHN  
SEELY  
BROWN



# KILLJOY CORNER

BY MITCH BETTS

A VETERAN OF TOO MANY TECHNOLOGY PREDICTIONS EXPLAINS WHY ALL OUR VISIONARIES WILL BE WRONG

**WITH ALL DUE RESPECT** to the luminaries in this special issue: Their 10-year predictions are very likely to be wrong, some laughably so. It's not that these people aren't smart. But when it comes to specific, long-range predictions about technology, the whole human race has a rotten track record — for reasons that are, um, quite predictable.

Those who witnessed — or took part in — the birth of the telephone, radio, laser, computer, steam engine, VCR or countless other inventions were terribly inaccurate at imagining their futures, says Nathan Rosenberg, an economist who studies technological change at Stanford University. Marconi thought his new radio would be used only for ship-to-shore communication. Invention of the transistor received a tiny mention inside *The New York Times*, which said it "might be used to develop better hearing aids for the deaf." Western Union turned down the chance to buy Alexander Graham Bell's telephone patent for a mere \$100,000.

In hindsight, the future was "obviously not obvious," Rosenberg says. And there's no reason to think we can do any bet-

ter — so don't be smug.

One problem is that new technology first appears in such a primitive stage that it's hard to imagine it has any future at all. In 1949, IBM predicted there would be a market for no more than 10 to 15 computers. The fact that the early machines relied on 18,000 vacuum tubes and took up an entire room probably limited everyone's imagination, Rosenberg says.

Sometimes technology doesn't take off until a complementary technology arrives. The laser didn't revolutionize communications until it was hooked up to fiber-optic cable. The Internet wasn't such a big deal until after Tim Berners-Lee decided he needed a hyperlinked telephone directory and wrote the software for the World Wide Web.

Many of the predictions you see at this time of year are nothing more than extrapolations from today's conventional wisdom. That's dangerous. The prevailing view in the early 1980s was that an unshackled AT&T would become a big player in the computer industry. So in 1982, when *Omni* magazine published its predictions for 2000, it said, "IBM will find itself competing with AT&T on the high end of the spectrum and Atari on the low end." AT&T? Atari?

Beware of specialists who make predictions, says futurist Graham Molitor, because they fail to consider factors outside their fields of expertise. Frequently neglected by technologists are the social, legal and political climates to come. That's why it's so naive to think the Internet will remain an unregulated and untaxed frontier for long. Communications media get regulated and commerce gets taxed. Period.

Somehow, it never occurs to technologists that consumers won't just gobble up every gizmo they can conceive. In the 1960s, AT&T figured that at least 3 million Picturephones would be in use throughout the U.S. by the late 1980s. That obviously didn't happen — and not just because Americans didn't want to jump out of the shower to answer a Picturephone. It also was too expensive: Initially, the terminal cost \$1,500, plus a service charge of \$100 per month.

When we make 10-year predictions, we like to think there

will be dramatic changes between now and then. But will there be? Widespread adoption of even the best ideas takes longer than we expect. The "Year of the LAN" was 10 years in the making. Business concepts such as total quality management and using information technology for customer service took seven years to become mainstream, according to the American Management Association.

So what's a reader to do? Enjoy. Be a careful consumer of predictions and gee-whiz articles. Don't take them too seriously. Remember that, according to Gartner Group, emerging technologies go through four stages: hype, disillusionment, enlightenment (when the technology is ready for prime-time use) and real-world productivity benefits.

At the moment, for example, biometric identification technologies are in the hype stage and headed for disillusionment real quick. How many Americans are going to warm up to the idea of getting fingerprinted or eye-scanned to do routine transactions? Smart cards have already fallen into the disillusionment canyon and may never climb out, except in a few niche markets.

But some humility is called for. As that great philosopher Winnie-the-Pooh says, "That's what I think, but I don't suppose I'm right." ☐

Betts is an assistant news editor at Computerworld. His Internet address is [mitch\\_betts@cw.com](mailto:mitch_betts@cw.com).

# How do you integrate internet, multimedia, and intranet in a call center?

Answer: Any way that works for your customers.

Via multivendor enterprise switching systems.

With computer-telephony integration apps  
running on open client/server standards.

Tied into any database you can name. And

with Windows-based authoring tools to create

interfaces that reflect your operations like a mirror.

However your customers want it, Aspect delivers.

It's all about the customers. Reaching you how  
they want, when they want. And getting treated  
the way they like. That's how we've built Aspect, even

pegging our compensation to customer satisfaction.

So give us a call... a click... whatever you like.

1.800.226.8440. [www.aspect.com](http://www.aspect.com)

Call Centers. Done Right.



ASPECT

Company and product names mentioned herein may be trademarks of their respective owners.



"If they can put a man on  
the moon, why can't they solve  
my company's IT problems?"

We did. And we can.

LOCKHEED MARTIN



SUCCESS:

# Software

Databases • Development • Operating Systems

## Briefs

### NetWare Java kit

Novell Inc. in Orem, Utah, has announced the availability of its new Developer Kit. The product allows users to create Java applications for the company's NetWare, Novell Directory Services, GroupWise and ManageWise products. This kit is free to members of Novell's Developer program.

### Sun Java tools

Sun Microsystems Inc. has released Version 1.1 of its Java Media Framework application programming interface. The product lets developers add multimedia elements to their Java apps and applications.

Sun also has released a programming interface for three-dimensional objects. And it has shipped a 1.0.3 maintenance release of the Lightweight Directory Access Protocol for the Java Naming and Directory interface, which is used in server-side enterprise applications.

### IBM free Java code

IBM has announced that it is making available the source code for its Java compilers, files in a stand-alone source-code-to-byte-code compiler.

### Data transform tool

Carlson Corp. in Minneapolis, Minn., has released ParallelDimension, a high-performance data transformation tool that allows users to convert data for data warehousing into a form compatible with the leading online analytical processing (OLAP) databases and analysis tools.

These tools include Information Advantage Inc.'s DecisionSuite, MicroVintage Inc.'s DES Agent, Hyperlink Solutions Corp.'s Enhance, Oracle Corp.'s Express and Discover, Humberlight Communications Ltd.'s Public, Cognas Inc.'s PowerPlay, Iris Technology Inc.'s IrisQuery and Microsoft Corp.'s OLAP.

The product runs on Windows NT and all major Unix platforms. Pricing starts at \$50,000.

## Java 2 critiques in; views mixed

• Graphics better, but browser support a worry

By David Overstrom

JAVA'S USER INTERFACE and graphics capabilities are improving, but the size of such visuals and the inconsistent support among browsers for the new features are making developers wary of using them.

The new features come in Sun Microsystems Inc.'s Java 2, announced last month. In its core — not as an add-on — it now has visual

tools called Java Foundation Classes. These include the Swing user interface components and the Java 2D application programming interface (API). Sun also released the Java 3D API for three-dimensional images. [CW, Dec. 14]

With Java 2, developers can write visually appealing programs entirely in Java, said Mike Gilpin, an analyst at Giga Information Group Inc. in Cambridge, Mass.

Corporate users want to use Java 2 to create a client that can be used to view an Internet site.

## Mott's juices R/3 with performance monitor

► Envine application uncovers hidden snags

By Craig Stebbins

AFTER MOTT'S NORTH AMERICA went live with SAP R/3, its users' work slowed down. But the app's pace and price maker's attempts to find out why were stalling in the dark.

R/3's built-in systems management tools let Mott's information technology staffers look at only the internals of the application engine itself. Mott's couldn't see what was happen-

ing to R/3 transactions once they left the application server and got on its network or the PCs at the end of the pipe, said Mark Tarni, director of application technology at the Stamford, Conn., company.

That became a problem in late 1997, when the number of users and the amount of data stored in R/3 grew large enough to start stressing the system. So last spring, Mott's became one of the first users of a new breed of non-SAP R/3 performance monitoring tools that cast a wider eye on SAP's market-leading enterprise resource planning applications.

Developed by Envine Corp. in Mountain View, Calif., the product — one of several available from small software vendors — is helping Mott's uncover hidden throughput snags.

"Before, users would call up and say their response time was horrible, and there was a lot of gut feel and guessing about what was happening," said Dom Verrastro, director of data center services at Mott's. "Now we can put facts and data behind that."

For example, system ordering by grocery, which accounts for 80% of the orders that Mott's receives, started taking longer with R/3, Verrastro said. Mott's was able to isolate that

part of the system and find out what was bogging things down so that the order-processing configuration could be streamlined.

Mott's also discovered that some of its 400 R/3 users were mistakenly set up to run resource-hogging transactions that go deep into the system and read all the records in a data table. Verrastro said. And it can now put a microscope on individual users and identify ways they can use R/3 in a more efficient manner.

Other vendors selling R/3 performance monitors include Luminate Software Corp. in Redwood City, Calif., and Naples, Fla.-based OptiSystems Inc. [CW, Sept. 7].

In late December, OptiSystems officials said an upgrade of the company's performance analysis tool for R/3 is due for shipment in January.

The new tools are a big advance over R/3's built-in moni-

toring software, which "is hard to get meaningful data out of," said Steven Tirone, an analyst at AMR Research Inc. in Boston. But he estimated that only a few dozen companies have started using them.

In addition, the products from Envine and its rivals primarily are reporting tools that leave the application management process a manual affair for R/3 users, Tirone said. "What they're doing is essentially the easy part," he said.

Mott's still is waiting for Envine to integrate its response-time monitoring software with a separate tool that analyzes R/3 service levels, Tarni said. But just being able to track basic transaction performance is a boon because it's hard to test the applications before going live, he added.

"We simulated everything, but the system really didn't get its first full-blown run until we flipped the switch," Tarni said. □

### MOTT'S NORTH AMERICA

HEADQUARTERS: Stamford, Conn.

PARENT COMPANY: Cadbury Schweppes PLC

WEB SITE: www.motts.com

MAIN PRODUCTS: Juices, applesauce and molasses

NUMBER OF R/3 USERS: 400

SYSTEM DETAILS:

• IBM RS/6000 SP server

• Oracle databases

• R/3 finance, manufacturing, logistics and human resources applications

## Snapshot

Why users buy document management systems:

1. To improve customer service 72%
2. To lower costs 55%
3. To meet regulations/standards 48%
4. To speed time to market 45%
5. To increase revenue 36%

Source: Survey of 200 users across Europe; multiple responses allowed. Source: Document Systems International, 1997. ©1997 LSI, London

# Java 2

CONTINUED FROM PAGE 93

possibility that graphics would hurt performance.

BAX Global, a logistics company in Irvine, Calif., uses Java where it can, because its platform neutrality lets the company port its server-side code to other platforms as a server hits its limits.

Programmers can also continue to work in each of those different environments, said Michael Ingardia, a consultant who is employed by Atlanta-based Perdyne Technology Solutions LLC and is currently working at BAX.

On BAX's intranet, users see a Java interface and rich-looking maps, helped along by the Joeses tool from Java graphics component maker Ilog SA in Gentilly, France. "In that case we have more

freedom because we have more control over the user," Ingardia said.

But over the Internet, where users are more diverse, the company sticks with HTML as the front end. □

**MOREONLINE**

For Java resources, visit Computerworld online.

[www.computerworld.com/more](http://www.computerworld.com/more)

## NEW PRODUCTS

**THE GREAT ELK CO.** has announced Panorama, data warehousing software designed for nontechnical users.

According to the Bannockburn, Ill., company, the relational online analytical processing tool connects directly to any database supporting Microsoft Corp.'s Open Database Connectivity standard. It offers a drag-and-drop interface for creating and running inquiries, and it provides automatic optimization of queries, percentage calculation and management, color-coded variances in tables and filter tools.

The price is \$1,000 per user for implementations of 100 users or more.

**The Great Elk Co.**

(847) 537-0308

[www.greatelk.com](http://www.greatelk.com)

**LEGATO SYSTEMS INC.** has announced NetWorker Remote, backup software for remote desktops and laptops.

According to the Palo Alto, Calif., company, NetWorker operates on a Windows NT Server and provides centrally managed data protection and disaster recovery. It transmits only changed data after an initial full backup and includes intelligent compression capabilities. Integration with Microsoft Corp.'s Explorer enables file and directory restore without administrator intervention.

Pricing starts at \$15,000 for one Legato to NetWorker Remote Server and support for 50 laptops or desktops.

**Legato Systems**

(650) 812-6000

[www.legato.com](http://www.legato.com)

**PILOT SOFTWARE INC.** has introduced the Retail Performance Monitor retail application.

According to the Cambridge, Mass., company, the online analytical processing software provides a centralized view of the retail chain and can identify groups of unprofitable products within stores. It can also help users visualize the effects of price increases over time, evaluate the sales impact of markdowns and monitor location and merchandise contribution.

Pricing begins at \$50,000.

**Pilot Software**

(617) 374-9400

[www.pilotsw.com](http://www.pilotsw.com)

**STERLING SOFTWARE INC.** has announced SAMS/VTape, software that enables a mainframe to work with "virtual," non-hardware-based tape-storage volumes.

According to the Rancho Cordova, Calif., company, the software uses existing disk and tape storage hardware and allows tape volumes to be written to a disk buffer, instead of directly to tape. The "virtual" tape volumes residing on disk can be served at disk speed and can be stacked before output to tape.

Pricing begins at \$24,000.

**Sterling Software**

(916) 463-8500

[www.storage.sterling.com](http://www.storage.sterling.com)

Another Deloitte Consulting Difference

**THEM:**

**DELLOITTE CONSULTING:**

**We know what works.**

*Confidence is not being  
Arrogance is something else altogether.*

*At Deloitte Consulting, we never promise to have all the answers.  
Because we've learned over the years that certain insights  
can only come from inside our client's organization.*

*Which is why we work collaboratively with you.  
And treat everyone, from your corner offices to the cubicles,  
with respect. It's all part of a working style that has proven to secure  
employee buy-in to changes at hand. Which ensures the complete  
transfer of the additional knowledge and skills your people  
will use to deliver the promised returns of any  
new strategies and technologies.*

*For results you can count on today.  
And build on tomorrow.*

**A very different approach. For very different results.**

**Deloitte & Touche Consulting Group**

[www.dtcg.com](http://www.dtcg.com)



# More than Web-to-Host

If you have a mainframe, somewhere around 70% of your corporate data is on it. But if that data is not available to the users who need it, it's being wasted.

When is web-to-host not enough? When you can't access all of your hosts from all of your client platforms, when it's too slow, when you need to sacrifice important features in order to have it.

When is web-to-host more than web-to-host? When it's Winsurf Mainframe Access. WMA gives users concurrent browser-based access to all of your data, combining 3270 and 5250 access to IBM hosts with VT access to DEC and Unix

## It's Your Future

hosts. WMA lets you control deployment, access and configuration rights throughout your network from a single central server. And you don't need to sacrifice full printing, HLLAPI support, or file transfer capability.

Web-to-Host technology is exploding; projections\* show it is the future for host access. WMA's technology is ahead of the pack, with ease of use, native support for 16- and 32-bit Windows clients as well as HTML-based support for Mac, OS/2 and other clients. In addition to TN3270 and TN5250, WMA supports native access to SNA server and Netware for SAA.


Call Data Interface to learn about this exciting new technology, and about how WMA makes it cost-effective, easy to use, and easy to manage.



**DI DATA INTERFACE**  
DIVISION OF ICON INFORMATICS

512-335-8200 • FAX 512-335-9110 • 800-351-4244 • [www.di3270.com](http://www.di3270.com)

\* Source: International Data Corporation



Is it possible to  
give the  
performance  
of a lifetime  
every single day?

When running a department, there are no dress rehearsals. Which is why you need a server that delivers an unforgettable performance daily. Designed with our Highly Parallel Systems Architecture and dual Pentium II

processors, the new Compaq ProLiant 3000 has all the power you need. And the unmatched availability to handle today's demanding departmental applications. To see how it outperforms its competition and performs under budget, contact [www.compaq.com/servers/performance](http://www.compaq.com/servers/performance) or 1-800-AT-COMPAQ.



**COMPAQ** Better answers.

## Servers &amp; PCs

Large Systems • Workstations • Portable Computing

## Briefs

## Server quick-start

IBM has announced quick start-up packages for Oracle Parallel Server designed so that corporate users can implement the hardware and software in a matter of days. The cluster offerings unite the new IBM Netfinity 7000 line server with Parallel II Xeon processors, Fibre Channel storage and start-up support from IBM Global Services. IBM Netfinity Cluster Enablement Software for the Netfinity 7000 line Server/Oracle Parallel Server configuration will be available free from IBM's Web site this month.

## Thin-client deal

GraphOn Corp. in Campbell, Calif., has acquired Ottawa-based Cord Corp.'s thin-client technology and the thin-client engineering team and facilities in exchange for Cord getting a 25% share in GraphOn. GraphOn provides access to 32-bit Windows applications from virtually any platform. GraphOn also offers remote access software for Unix and Linux on this clients. Its businesses include IBM and Sun Microsystems Inc. in Mountain View, Calif.

## Euro symbols

Washington-based Centurion-Soft has developed a utility called EuroFaster that adds the euro symbol to all TrueType fonts. EuroFaster runs from and updates the fonts on Windows 95, 98 and NT 4.0. It costs \$40.

## STAYING ON COURSE

How will your PC budget change in the next two years?



Base Survey of 50 Fortune 1000 companies

Source: Forrester Research Inc., Cambridge, Mass.

## PC market a hard drive in '99

## ► Analysts predict year 2000 will push upgrades

By April Jacobs

FOR PC MAKERS, 1998 was a year of falling prices and bullish sales, coupled with rocketing processor performance and manufacturing and distribution changes. The new year will be more of the same, analysts said.

1998 also was a year when corporate buyers tried to make sense of what seemed like endless processor upgrade cycles and falling prices. They also tried to control desktop support costs.

Intel's chip pace "had a heavy impact on trying to have a standard PC—unless we bought them all within a month or two—which affected us in terms of service and support," said Dave Geiver, senior technology officer at First Premier Bank Corp. in North Sioux City, S.D.

The result has been a more complex desktop environment, so First Premier will focus this year on finding and implementing tools that let it automate software distribution. Desktop support tools that don't require technicians to visit end users also will be paramount, Geiver said.

**In 1999, IT managers will continue to grapple with total cost of ownership, analysts say.**

1999 is expected to be marked by users frantically checking year 2000 compliance. That's likely to bring operating system upgrades from Windows 3.x and hardware upgrades to fix year

2000 flaws, analysts said. Richard Fichtner, an analyst at Cambridge, Mass.-based Giga Information Group, said companies with PCs that predate 1995 are open to problems, and he added that companies with Windows 3.x will be looking to upgrade. At least 30% of com-

panies still run Windows 3.x, he said.

► The combined value of inventory for PC makers, distributors, retailers and component suppliers decreased 18% in the third quarter of 1998—a five-year low.

► The ratio of inventory to sales decreased from 0.21 in the second quarter of 1998 to 0.16 in the third quarter of 1998.

Source: Envision & Research, San Jose, Calif.

panies still run Windows 3.x, he said. 1999 also should be a year in which vendors such as Houston-based Compaq Computer Corp. and IBM try to redefine how they sell computers.

"In 1998, we proved that channel assembly is not the savior for the indirect manufacturers," said Steve Kleynhans, an analyst at Stamford, Conn.-based Meta Group Inc.

Companies such as Compaq and IBM tried that approach to match the facilities of build-to-order direct sellers such as Dell Computer Corp. and Gateway

Channel assembly uses systems integrators and distributors to custom-configure systems so that the PC maker can continue to make standardized systems in its factories.

"In 1999, there will be an increased focus on more direct contact with customers. All the indirect vendors have to find a way to build a hybrid model that bridges the gap between themselves and their customers," Kleynhans said.

Through it all, information technology managers will continue to grapple with total cost of ownership, analysts said. □

## Y2K PC buying spree means healthy 1999

By April Jacobs  
and Juan Carlos Perez

YEAR 2000 UPGRADES, coupled with the trend of faster-yet-cheaper systems, will boost demand for PCs in 1999, but only at the low end, said Steve Kleynhans, an analyst at Stamford, Conn.-based Meta Group Inc.

Kleynhans said there's been as much as a 30% drop in the price corporate customers are willing to pay for new PCs. Bid prices for corporate desktops averaged about \$2,100 in January 1998 but had fallen to about \$1,500 by December, he said.

The latest evidence of downward price pressures came from Hewlett-Packard Co., which last month cut the price of about 65 PC models, some by up to 20%.

HP's aggressive price cuts were unexpected because de-

mand for PCs has jumped due to a year 2000-spawned upgrade demand, said Carl Howe, an analyst at Forrester Research Inc. in Cambridge, Mass.

But once that buying spree ends, the PC market is expected to slow late in 1999 and in 2000. Then, price wars will ensue, and industry revenues will drop by about 15%, from \$55 billion in 1999 to \$47 billion in 2000, Howe predicted.

"This drop in demand will come as a shock to many people," Howe said. Another factor affecting the PC market will be a rise in demand for network computers, he said, something that falling PC prices alone won't be able to offset. (Also see chart at left.) □

Perez writes for the IDG News Service.



## A business card that's a CD

The business card of the future may be here today. Ember Media Corp. in New York has developed a multimedia, business-card-size CD that can hold 16M bytes of information — be it a company's product catalog, a new product presentation or brochures.

DigiCard CD cards can use audio, data and video and can contain a hyperlink to the customer's Web site.

Ember loads a company's information on the CD cards, at pricing that starts at \$500 for a return. Companies must buy a minimum of 500 cards at \$1.50 each.

The DigiCard CD is compatible with Windows and Macintosh operating systems and can be played on any CD-ROM drive or audio CD player that has a spindle or a CD tray.

— Bob Wallace

*Deploy two new 32-bit applications.  
Multiple types of computing devices.  
Various platforms and operating systems.*



## *It's possible.*

**Citrix server-based computing solutions can extend access to Windows-based applications for your various devices in less time than ever before.**

Citrix® WinFrame® and MetaFrame™ for Microsoft® Terminal Server, have enabled thousands

of companies like yours to leverage their existing hardware investments and deliver cost-effective access to the latest Windows®-based applications for an increasingly diverse—and growing—user base.



**Deliver high-performance application access to the latest Windows and non-Windows devices.**

With Citrix, you can use virtually any device to access vital applications, including x86- and Pentium®-based PCs, Windows-based terminals, network computers, wireless devices and information appliances, as well as DOS®, UNIX®, OS/2® Warp, Mac® OS and Java™ clients. Plus, Citrix works over existing network connections (WAN, broadband, wireless, Internet/Intranet) and protocols (TCP/IP, IPX, SPX, NetBIOS®, Direct Asynch.) so you can avoid expensive network upgrades.

**Ensure users have full access to the resources they need to be successful.**

WinFrame and MetaFrame enable administrators to extend applications to users anywhere with just a

browser. Plus, remote users are able to use their local resources to copy, print or save vital information.

**See what 77% of Fortune 100 companies already know—Citrix works!**

Discover how thousands of leading companies are making the impossible possible and extending business-critical application access to more users and devices with Citrix WinFrame and MetaFrame.

**To learn more about how Citrix can help you, call 888-564-7630 or visit us on the Web at [www.citrix.com/drivel](http://www.citrix.com/drivel) for a FREE Test Drive CD-ROM.**

# CITRIX®

## Managing

## Flashback '98

# LOOKING BACK

**Q. What's happened to the people we've profiled — GE's Gary Reiner, GM's Ralph Szygenda, the married CIOs and Netscape's "Director of Reinventing?"**

**A. Plenty**

**LIZ AND NORM ALEXANDER: POWER COUPLE SHIFTS GEARS**

Remember the married CIOs? They're now a CCC, a consultant/CIO couple.

Norm Alexander, still a CIO, is up to his neck in globalization. The Greenbrier Cos. in Lake Oswego, Ore., the railroad

car-making company at which he works, has added plants in Canada, Mexico and Poland. The soft-spoken CIO traveled to Poland in May to see how things stood technology-wise; he found plenty of DOS-based

Clipper database applications running on 386s. His next step: suggesting Greenbrier's next step.

Meanwhile, Liz Alexander parted ways with veggie-patty maker Gardenburger Inc. in early April last year.

Gardenburger's ad spot on the *Seinfeld* finale last May played a little role in her departure. Liz felt the company was holding back on information technology investments so it could put more money into advertising and marketing.

She didn't want to play Ms. Tight Fist, not when there was big money and greater flexibility in consulting.

So Liz hung out her own shingle as a consultant, and now she's managing a project for a natural gas company and giving Norm free advice at the dinner table.

Because after all, Liz jokes, "He can't afford my rates."

"The two years of overlap was dynamic and exciting," Liz says, "but that couldn't go on forever. We had two very demanding jobs. It was hard to give our all to the job and the family."

"Balance is never a static point. It's a continuous movement."

— Allan E. Alter

**GM'S RALPH SZYGENDA: THE \$700 MILLION MAN?**

When *Computerworld* spoke with General Motors Corp. CIO Ralph Szygenda last spring, his top goal was to "do the impossible" or "what people think is impossible." Namely, to leverage IT in an effort to make dramatic changes at the \$177 billion automaker.

Though Szygenda acknowledges that the world's biggest company still has "immense" challenges, he's well on his way to helping GM fundamentally change the way it does business.

Szygenda-led projects at GM include the following:

- A Web-based system called GM Bypower that lets consumers in the Pacific Northwest do online comparison-shopping between GM and non-GM vehicles through a third party. The system, which GM was to take nationwide at the end of last year, lets customers pick out a car or truck and gain pre-approved GMAC financing online before picking up their



Ralph Szygenda

vehicles at dealerships.

- The consolidation of 28 computer-aided design systems into one standard system for all GM-built vehicles within the next year. The standardization effort — aided by business process re-engineering activities in GM's factories — has cut the product development cycle from three years to two, with hopes of whittling that down to 18 months.

- Deployment of an integrated supply-chain system called

Looking back, page 100



Norm and Liz Alexander

# LOOKING BACK

CONTINUED FROM PAGE 99

Globak at that will be together vehicle production, sales and development. The system is being launched at a Saturn plant in Wilmington, Del.

Those moves, along with the 1996 restructuring of GM's out-sourced IT services to Electronic Data Systems Corp., have helped share \$400 million in IT expenses during the past two and a half years, Seygenda says. Slashing GM's IT costs has been one of Seygenda's top goals for the past few years.

Seygenda said he expects the company to cut another \$300 million in costs during the next three years, in part by replacing 70% of its costly legacy financial systems with SAP America Inc.'s R/3 systems during the next five years. That would add up to \$700 million in savings.

"The industry said we couldn't do it," he says, "but clearly we're making significant changes."

— Thomas Hoffman

## CIGNA'S 'BUD' BAUMANN: FROM IMPLEMENTER TO 'COACH'

Since we wrote about Charles "Bud" Baumann in April, he's let go of some of his day-to-day IT operations responsibility and moved further into growing Cigna Corp.'s disability insurance operations.

"When you're on the business side, you have to let go of some of the reins," Baumann says. That means "trying to be more of a

coach, counselor, negotiator, supporter" as opposed to directing how to implement an IT solution.

As vice president of IT at Cigna IntegratedCare, Baumann is still in charge of integrating applications from Cigna's health care, disability and workers' compensation units.

But he spends half his time as vice president of Cigna's Managed Disability Unit, "developing a busi-

ness plan for the technology, putting together the right business processes to make that technology work [and] matching customer needs with our capabilities."

Meanwhile, the integration technology Baumann helped develop — now known as Cigna UnityLynx — has been rolled out nationwide and is being fine-tuned. The ability to streamline the claims process by pulling together data from multiple applications is reducing disability costs by at least 15%, he says. — Robert L. Scheier

## THOSE STRANGE

### JOB TITLES:

#### MISSION RESTATEMENT

Early last year, Paul Davis was Netscape Communications Corp.'s empiricist, a title he chose for himself. As a quality assurance and testing specialist, he "believed in actual evidence and didn't take anything on faith" — an empirical approach.

Davis recently became OEM Project Manager, a title cooked up by the human resources team at Netscape to describe his new role of coordinating work among the company's development partners. But Davis is looking for something more Silicon Valley-esque to put on his business card.

"I haven't come up with any flashes of brilliance yet, but that title is way too boring for me," he says.

Ren Rice is still director of re-inventing at Sentara Health System in Norfolk, Va., and he's still "re-

inventing, getting in trouble, causing chaos and getting slandered."

But not slandered as much, it seems. Rice's re-inventing department changed its modus operandi during the year.

Its mission is still to help the company improve quality and cut costs, but it no longer acts as a think tank that dreams up new methods for others and hands them down.

Instead, it acts as an internal consultancy that responds to requests for help from other groups, including IT.

He called the realization that you can't improve quality without user acceptance an "a-ha" moment for some people.

— Gary H. Anders

## GE'S GARY REIMER:

### NEW DEAL AT SIX SIGMA

Three years into General Electric Co.'s Six Sigma quality gamble, CEO Jack Welch has brought in a new player.

Peit van Abeelen has moved from GE Plastics to the new post of vice president of Six Sigma Quality, replacing erstwhile quality czar Gary Reimer, who remains CIO.

Van Abeelen says the change reflects a natural progression from setting up the Six Sigma IT program, an IT-intensive effort, to following through.

"The first two years was a lot of infrastructure," he said in an internal GE communication. "Now you've got to make Six Sigma the way you work."

GE is playing awfully close to the vest, however. Neither Reimer nor van Abeelen was available for comment, and some Wall Street analysts think there may be more to the reshuffle.

"Six Sigma was rather bureaucratic, and there were some grumblings that all wasn't well," one analyst says. "Maybe [Welch] wants a change in the style or the pace of it."

Style aside, Six Sigma appears to be paying off for the utility. According to officials at GE, this year's estimated costs of \$450 million for Six Sigma training and projects will yield cost savings of about \$1.2 billion.

— Kathleen Melymuka



Gary Reimer

## LOC KHUU: LOYALTY 1, RETENTION 0

When we last spoke with Loc Khuu, he was a new hire at The Chase Manhattan Bank Corp.'s Information Technology Associate Program.

Khuu had taken the job after four years in Chase's Smart Start program, a "firm trainee" designed to give students business experience and build loyalty while grooming them for full-time jobs upon graduation.



Loc Khuu

Unfortunately for Chase, Khuu recently signed on to a different team. He left the bank this fall to become a systems analyst at insurance brokerage J & H Marsh & McLennan Cos. in New York. "I thought it was a good idea to go to different places and learn different things while I'm still young," he says.

Though Khuu says the Smart Start program was a win for him and Chase, he says nothing can guarantee retention in today's free-agent IT market. "If you stay in one place too long, you become not as marketable as you should be," he says. "This industry is very dynamic. It's very tough for any company to retain skillful people."

Retention is elusive, but loyalty may not be. "I like to see different things," Khuu says, "but down the road, after I get more knowledge, I'll probably go back to Chase."

— Kathleen Melymuka



Bud Baumann



**SENTARA**  
Sentara Health  
Division of Sentara Health  
Sentara Health  
One Sentara Blvd. 4th  
Floor, Norfolk, Virginia 23510



**NETSCAPE**  
Netscape Communications Corporation

Paul Davis  
Empiricist

On East 14th Street  
New York, NY 10003  
http://www.netscape.com

PAUL A. STRASSMANN

## THE BATTLE OF THE MILLENNIUM: CIOs VS. LAWYERS



IOs of the world, beware! The year 2000 legal manhunt has begun. The traps have been laid, the hinges of litigation have been oiled and a posse of lawyers is rehearsing how to bag the catch.

Nothing, not even the so-called year 2000 Good Samaritan Act, can prevent a litigator from transforming a year 2000 incident into class action, directors' negligence, professional liability, breach of contract, warranty claims and misrepresentation suits. And believe me, there are law firms that will rise to the occasion.

After years of talking mostly to CIOs, I recently addressed a meeting of lawyers gathering to discuss year 2000 issues. What a difference from those cozy, chaty IT conferences! The lawyers' conclaves were like a tank commander's briefing just prior to an attack. Each presentation was sharp, with the full text available. The arguments were documented: no fluff; only facts, footnotes and cases. It's easy to predict who will prevail. The lawyers have scouted the terrain and have zeroed in on their targets.

Meanwhile, the CIOs are counting — as usual — on emergency fixes, instant improvisations, tolerance of unfulfilled promises and budget increases to save their butts.

That won't do this time. Look what the lawyers have cooking:

**PRODUCT LIABILITY CLAIMS:** Lawyers have started collecting information, including advertising copy, technical manuals, press releases and "bug" postings from online bulletin boards to demonstrate that suppliers had early knowledge of potential year 2000 malfunctions.

**OFFICERS' AND DIRECTORS' LIABILITY:** Legal counsel is now asking when management first learned that its computer systems could be noncompliant. If there's a failure, lawyers will argue that every day that passed was a missed opportunity for directors to perform their duty. Testimony from former employees

and copies of warning memoranda will be especially damaging under such circumstances.

**BREACH OF CONTRACT AND WARRANTY CLAIMS:** Lawyers realize that year 2000 suits will involve multiple litigants. If A sues B, B will sue C so that C can recover damages from A. Meanwhile, legal fees are incurred at each step. It was clear from the meeting that lawyers are ready for prolonged confrontations.

**FRAUD AND MISREPRESENTATION:** If all else fails, parties will be sued for falsification of information. Inevitably employees will point fingers at overstated project schedules and euphoric claims about reliability — conditions that are chronic in the computing profession, especially among managers. Lawyers already understand that this is an exploitable weakness that plays well under cross-examination of witnesses. Consultants and outsourcing firms will be particularly vulnerable if they made representations that turn out to be unsupportable puffery.

**INSURANCE CLAIMS:** When everything else fails, reach into the pockets of insurance carriers. The insurance commissioners in most states have ruled that the carriers can exclude year 2000 coverage. When such an exclusion is written at policy renewal time, it could imply that it must have been included to begin with. I listened to an inconclusive argument between two lawyers about that.

**INCrimINATING EVIDENCE:** Class-action lawyers will hire private investigators (who were present at the conference) to dig up damaging documents from disgruntled employees and pro-

grammers. Often, this will be done outside the usual discovery process to find new lines of inquiry to strengthen the plaintiff's case.

**MANAGEMENT IMPLICATIONS:** Blaming programmers for the year 2000 glitch won't stand up in court. The omission of two digits has never been purely a coding problem or a cost-saving measure. Making trade-offs among profits, investments, operating priorities and quality requires the full engagement of top management — in particular the CIOs.

But I don't see any indication that computer people are ready to explain how and why the year 2000 problem happened and how similar problems can be avoided in the future. In fact, the computer folks don't yet understand the legal traps that will snare them or realize that the year 2000 lawsuits will bring in their wake far closer executive oversight of the IT function than we've known to date.

CIOs will learn the simple truth that who pays and who goes to jail are what legal disputes are all about. Everyone should understand that corporate officers and directors will surely not wish to assume any blame as year 2000 defendants.

What an irony! Of all people, it will be the lawyers who finally track the IT profession how to provide quality software. They will be paid well for teaching what could have been mastered much less expensively years ago. □

Strassmann (paul@strassmann.com) served as a computer executive for more than 30 years and was able to avoid litigation for that entire period. He doubts if any 21st century CIO will be able to make that claim.

## SOURCES: FOR IT MANAGERS

The Smart Way to Buy Information Technology  
by Brad L. Peterson and Diane M. Carco  
Amacom Books, New York (253 pages, \$35 hardcover)

IT managers will find this book highly informative — and slightly entertaining. Peterson and Carco have written a valuable and detailed view of all sides of the information technology procurement process.

The authors draw upon complementary backgrounds. Peterson, an attorney, is a former computer programmer and an e-marketing representative at

IBM. Carco is a financial officer for IT at a large financial services company. The book sets the tone from the beginning with an "us vs. them" theme, hitting IT vendors over the head for pushy sales tactics, such as "ball-and-socket" and the "partnering" play. Although the authors acknowledge some "real" vendor/user partnerships, they pour some cold water on the practice, saying that it "gets you to buy products on bad terms."

Readers will want to focus on Chapter 7 ("Negotiating"), where the advice can help companies shop



strategies that can get them the best deals. The authors' chief message here: Search out every opportunity to seize the offensive in negotiations, and make sure your negotiating team speaks with one voice.

One mild criticism: Peterson and Carco engage in a little hype of their book in a couple of spots.

But the bottom line: An IT manager can get a lot out of this work, especially if some key buying decisions loom on the horizon.

— Rick Seals





Whether you're looking for an entry-level workgroup server, a mid-range departmental server or an enterprise-class workhorse, Gateway can make the connection. We're committed to safeguarding your critical data today. And we help you prepare for tomorrow with industry-leading manageability, improved scalability and maximum flexibility on each reliable server we sell.



#### ALR® 7000 Series Workgroup Servers

Ideal for both startup companies and power-hungry workgroups, the ALR 7000 Series offers big server features at a small price. With advanced processor power, integrated I/O technology and built-in server management features, these systems deliver incredible power and flexibility. An easy and cost-effective upgrade path includes dual processing and redundant, hot-swappable storage.

- ALR 7200 Pentium® II processor-based server (dual-processor ready)  
**Starting at \$2399**
- ALR 7300 Pentium® II Xeon® processor 450MHz (dual-processor ready)  
**Starting at \$3799**



#### ALR 8000 Series Department Servers

Our ALR 8000 Series improves mid-range server performance with extraordinary expansion capabilities and dual-processing power support. Vast storage with up to 12 hot-swappable hard drives makes the 8000 Series perfect when data access is at a premium. Plus, advanced fault-tolerant capabilities include an error correction memory subsystem, and redundant, hot-swappable power supplies.

- ALR 8200 Pentium II processor-based server (dual-processor ready)  
**Starting at \$3699**
- ALR 8300 Pentium II Xeon processor 450MHz (dual-processor ready)  
**Starting at \$5199**



#### ALR 9000 Series Enterprise Servers

When you need maximum power and performance that's highly available, the ALR 9200 is the obvious solution. Up to four Pentium II Xeon processors deliver incredible data throughput at a low cost per transaction on this high-end, enterprise server. All this technology is packed into a remarkably small tower or 7U Rack-optimized chassis with lockable covers and a locking front panel.

- ALR 9200 Pentium II Xeon processor 400MHz (four-way processor ready)  
**Starting at \$7999**

Every Gateway client is unique, and so is every Gateway™ business system.  
Call and tell us what we can build for you.

**1-888-888-0382**

**www.gateway.com/corp**  
**cd code:20008**



**Get more out of the box.™**

All Gateway Catalyst™ Pentium, Pentium Pro, Pentium II and Pentium III Base processor-based systems are qualified to carry the "NETS Hardware Tested Year 2000 Compliant" logo because they have successfully completed the NETS 1560042000 test. These systems have also passed the Microsoft Millennium year 2000 test suite. Gateway cannot be responsible for any certified software that improperly with, results, or otherwise fails. These systems are not tested in the hardware and operating system and cannot be corrected by Gateway.

©1999 Gateway 2000, Inc. All rights reserved. Gateway, ALR, the "Get more out of the box" slogan and the Gateway shield logo are trademarks or registered trademarks of Gateway 2000, Inc. The Intel Inside Logo, Intel and Pentium are registered trademarks, and Pentium II Xeon is a trademark of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. Some products and services may not be available for all international locations. Many Gateway products are engineered to Gateway specifications, which may vary from the retail version of the software suite hardware if functionality, performance or compatibility. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping and handling and any applicable taxes. ALR Series server meet FCC Class A emission standards. FCC Class A products may not be sold for home use.



## INFORMATION YOU NEED



Get the information you already have to the people who need it. The information is there.

After all, you've invested millions creating it. The problem is, how do you deliver it to all the diverse users in your enterprise when, where and how they need it? Fortunately, that's a problem you can solve with SQRIBE Enterprise®

**Information for your people. Control for you.** SQRIBE Enterprise is a Web-based intelligent reporting solution that lets the Web-enabled enterprise deliver "live" information on demand to everyone who needs it. At the heart of SQRIBE Enterprise is the



SQRIBE Enterprise  
a complete intelligent reporting  
solution with intelligence  
delivers better information  
for better decision-making  
throughout your organization

ReportMart Enterprise Information Portal™. It gives users a personalized single point of access to all a company's information assets via their Web browser and a familiar search engine format. And it gives IT secure centralized control. **Proven in use by over half of the Fortune 500.** To learn more about

SQRIBE Enterprise, ReportMart and why companies like Chevron, Gap, Inc. and Merrill Lynch turn to SQRIBE to meet their toughest everyday reporting demands, call us at 1-800-505-4399 or visit

[www.sqribe.com](http://www.sqribe.com). We'll show you an information delivery solution that delivers results.

**SQRIBE**  
TECHNOLOGIES  
**THE ENTERPRISE REPORTING COMPANY™**

©1998 The SQRIBE logo, SQRIBE Enterprise, The Enterprise Reporting Company, and Enterprise Information Portal are trademarks of SQRIBE Technologies. Corp. ®/99 SQRIBE Technologies. Corp. All rights reserved.

## Review Center

Flashback '98

## Tech re



### BATTING (WINDOWS) 2000

Another full year of waiting for the successor to Windows NT 4.0 has passed, and in all likelihood, we are still a year away from the final product, analysts say.

#### THE NAME GAME

Aside from the August release of its second beta, last year's most notable NT 5.0 news was its name change to Windows 2000. Why the change is unclear. Whether Microsoft Corp. is trying to disassociate itself from NT's reputation as an unreliable operating system or whether it hopes people will lose track of how late NT really is has little bearing on the importance of Windows 2000. According to 200 large user sites surveyed by Computerworld, the percent of applications served by Windows 2000 will increase by nearly 15% during the next two years. Compare that with Unix, which is expected to stay even, and Novell Inc. NetWare, which may drop by 10%.

Windows 2000 most certainly will come out in pieces, says Dan Kusnetzky, program director at International Data Corp. (IDC) in Framingham, Mass., a sister company to Computerworld. Windows 2000 Professional, Windows 2000 Server and Advanced Server, formerly NT Workstation 5.0, NT Server and NT Server Enterprise edition respectively will likely be delivered in the second half of 1999, he says. The Data Center Server and the 64-bit editions of its pieces won't come out until 2000, he adds.

What has been seen in the betas gives every indication that Windows 2000 will have a profound impact on the way you work. Its primary features include the following:

- The Active Directory that centrally manages all network information and devices.
- Plug-and-play support, which automatically recognizes newly attached devices.
- Compatibility with Windows 95/98, so each will have an upgrade path to Windows 2000.
- The Management Console that replaces multiple utilities with a single interface.

The NT wait, the Linux boom, the Palm vs. CE and the move to ERP. They were among the trends, buzzwords and techno-flak in 1998. And, know what? They will be hot in '99, too. Here's a look at eight key issues from last year and a sneak peek into what you might expect in the year ahead



■ Support for the Kerberos security system, which has long been used to secure Unix networks.

Analysts say there isn't much users can do to

prepare for Windows 2000, "since making decisions about the operating system without its full context usually leads to disaster," Kusnetzky says. Also, there's no rush because most big information technology decisions get based on the database. Web servers and middleware, "which all run fine on NT 4.0," says Jonathan Eunice, an analyst at Illuminata Inc. in Nashua, N.H.

However, Eunice does recommend that users get their systems management in place before Windows 2000 is delivered. "It's very wise to have good mechanisms for software delivery, single sign-on and security in place before the big software change comes down the pike."

—Kevin Burden  
Tech review, page 106

## Flashback '98 Tech review

CONTINUED FROM PAGE 105

LINUX  
CLUSTER

The spotlight is shining on Linux, which has received pages and pages of positive press over the past year. Highlights include announcements of support from application vendors such as Netscape Communications Corp., Informix Corp. and Sybase Inc., and enhanced offerings from Linux-specific vendors such as Caldera Inc. and Red Hat Software Inc.

Indeed, 1998 "could probably be called the year of Linux. It became a market force to be dealt with," says George Weiss, an analyst at Gartner Group Inc. in Stamford, Conn.

One of the key trends in the Linux market as 1998 was the vendor application support promised for it, which analysts say is building user confidence in Linux and opening up additional uses for the free software operating system. "Oracle and Informix announcing some support was huge," says Bill Peterson, an analyst at IDC.

Up until 1998, Linux users turned to their peers on the Internet for support. Peterson says. Now vendors are taking on a support role. For instance, Red Hat introduced around the clock corporate support for Linux systems. Estimates circulating to the industry say there are now 7 million Linux users, a mixture of serious users and enthusiasts. "Most of Linux is running with Apache and running for serving up Web pages," Weiss says.

However, some users download Linux and don't use it, and not all Linux packages purchased from vendors are used on the server side, which makes it hard to track market numbers.

## THE FUTURE

Looking ahead, Weiss says, Linux needs to prove it has staying power. He says there must be consistency from version to version, more availability and better continuity. He also says users want to know whether or not the product can scale.

"They need to know how to get from Point A to Point B to Point C without a massive disruption," Weiss says.

As for what Linux will be used for in the future, Weiss predicts, "There will be pockets of strength." There will be heavy usage in areas of infrastructure functionality such as Web servers and communication protocols — areas where users don't really feel an operating system is a major component.

"It will be a block piece of layer infrastructure," he says.

— Amy Malloy

THE SCOOP ON  
CHIPS

You probably didn't start out 1998 thinking the year would end with \$599 price tags teasing home PC buyers or \$10,000 starting prices for four processor servers.

The wave of vendors driving faster systems into lower price ranges won't break in 1999, according to analysts — but there already are signs that PC pricing may be a little less crazy.

"Pricing has already stabilized a bit in the last two or three months, the corporate market is likely to see smaller price decreases than the consumer does," says analyst George Iwanicki at Dataquest in San Jose, Calif. He says Dataquest expects the sweet spot for corporate PCs to stay in the \$1,000 to \$1,500 range.

## TWO DIRECTIONS

PC chip technology is driving in two directions. First, Intel Corp.'s Pentium II line soared to 450-MHz, and Intel plans to offer a 500-MHz, multimedia-oriented, nicknamed Katmai in early 1999. Iwanicki expects a first quarter push into the corporate market by rival chip vendors releasing their next-generation chips, such as Advanced Micro Devices Inc.'s (AMD) 500-MHz K5 and Cyrix Corp.'s 600-MHz Jalapeno.

Meanwhile, AMD and Cyrix should continue to have an impact in the consumer market, where Intel responded in 1998 with its Celeron line of value-priced processors. By the end of 1998, consumers were able to buy 300-MHz PCs for \$599 after rebates.

## ON THE HORIZON

A key PC development that CIOs should watch for in 1999 is support for the Rambus memory bus interface offered by Rambus Inc. and Intel. In early 1998, vendors released the first PCs to jump from a 66-MHz bus to 100 MHz. Now Rambus — with a raw bus speed of 400 MHz — represents another speed boost, although technical limits won't allow the full 4-to-1 gain, Iwanicki says.

On the server side, Intel extended its Pentium II family with the Xeon line of processors, while bumping delivery of the 64-bit Merced architecture further into 2000.

Yet few people are eagerly awaiting the 64-bit chip. "Merced hype is just that — hype," says Jon Oltsik, an analyst at Forrester Research Inc. in Cambridge, Mass. With corporate buyers living in three-year time frames for their server purchases, Unix servers will continue to handle heavy-duty corporate applications, he says.

In 1999, Oltsik expects still more clock-speed boosts for Xeon, greater support for I/O input/output technology, and a move toward server hybrids, which will allow CIOs to partition multiprocessor servers to support multiple operating systems.

But the speed boosts for Intel servers won't help if CIOs still must wrestle with the limitations of Microsoft's Windows NT. The chip is almost secondary, NT is limited in that you can't run more than one application on one box. So if you bring in one new NT application, you have to bring in a new box. You'll have people who managed five boxes last year managing 10 boxes this year and so a year from now," Oltsik says.

— James Connolly

HANDHELD  
DANDIES

PDAs, handhelds, palmtops, CE device units — whatever you wish to call them — are hot and increasingly going the wireless route, as evidenced by 3Com Corp.'s recently announced Palm VII wireless platform personal digital assistant (PDA).

Tailing a little behind that in hype are the "twincers," the larger-format Windows CE Palm Pro portables. They're not quite notebooks or subnotebooks, but they're bigger than handhelds. Here's a quick look at some of the highlights in '98 that set the stage for 1999.

## PALM PC HURDLES

When Microsoft Corp. announced the Palm PCs (now called Palm-size PCs) early last year, "they were met with an interesting backlash of: 'Oh yeah, you're just trying to do this to compete for space from [3Com].'" says Jill House, an analyst at IDC. "But the Palm continued to do really well because the Microsoft ones had problems."

The battery life was really low, the screen was complicated, the interface wasn't friendly, and the voice recording was spotty, she says. Four products to date have been announced in this group.

## CE PRO CLASS

Formerly known as Jupiter, a new class of devices called CE Pro portables arrived late in 1998. These portables have full notebook wire screens and larger key-boards but are still considered hand-helds because they aren't robust enough to handle notebook functionality, according to House.

"I'm pretty dis-

appointed in the CE Pro format," says Ken Dulaney, an analyst at Gartner Group in San Jose, Calif. "The form factor is fine.... The problem is Microsoft software. If you were to be a Windows CE user today, what you would find out is that it's not compatible with Windows."

## PALM DOES WIRELESS

3Com's recent release of the Palm VII gives users built-in wireless access. "For the first time, you have the convergence of a couple of things: a popular device, the integration of wireless that has decent coverage in a popular device and a very major effort to provide Web content to that device," Dulaney says. "You still have to pay \$500, you've got to pay a monthly fee, and the architecture is proprietary to 3Com, although it does give you Internet access." But I think it probably has as good a shot as any in trying to kick-start wireless data, which has been a languishing industry."

## THIS YEAR'S OUTLOOK

Dulaney says he expects 1999 to be the year of maturation. "For example, the Palm and the CE devices will probably get color screens. We'll see more horsepower, more memory and more capabilities put into them."

"The announcement of the Palm VII, being a wireless platform, clearly indicates to us the wave of the future," says Gerry Purdy, president of Mobile Insights Inc. in Mountain View, Calif.

— Cathy Goggin

## BROWSERS:

## HERE'S LOOKING AT YOU

Though it may not feel like it, a lot more than the Microsoft Corp. antitrust lawsuit went on in the browser market last year. Netscape Communications Corp. gave away the source code to its browser, America Online Inc. purchased Netscape, Extensible Markup Language (XML) became a standard. A more intelligent browser emerged — browsers became more aware of the portals that feed them. Netscape Navigator 4.5 was released, and a beta of Internet Explorer 5.0 hit the market. Whew.



## Handheld PCs

**DEFINITION:** Small computers designed to fit in a person's hand. They are battery-operated and use a keyboard or pen as an input device. There are two groups of handheld PCs: standard handhelds and expandable organizers.

#### CODE OFF-LOAD

Locked in a bitter rivalry with Microsoft and its Internet Explorer, Netscape gave away the source code to its Communicator browser. It did that to encourage innovation from third-party developers, says Ted Schaller, director of software services at Forrester Research. Analysts say that move put Netscape in a difficult financial situation, which explains the AOL acquisition.

#### XML STANDARD

A standard was approved for XML, a language which was intended to help define and share document information over the Web. It's going to be more popular on servers than on browsers, says Mike Gotta, an analyst at Meta Group Inc. He says that's because it's easier to control servers, and the big value right now is in data exchange. The benefit on the browser will be more precise searches.

#### BROWSER ADVANCES

Product releases included Navigator 4.5 and a beta of Internet Explorer 5.0 — which should ship in the first quarter of this year. With those new versions, browsers have become more aware of the portals that feed them, Schaller says. For instance, Navigator looks back to Netscape Navigator to find sites. Schaller calls that "tethering," where a connection persists between the browser and the portal. Microsoft also has tethering, but won't exploit it the way Netscape will, he says. He expects Microsoft to rely on third parties to do that.

#### AOL ACQUIRED NETSCAPE

The single most important event in the browser market was AOL's acquisition of Netscape, says Andrew Bartels, an analyst at Giga Information Group in Norwalk, Conn. AOL provides a funding source for the continued enhancement and development of Navigator, thus improving the chance of Navigator's survival, he says.

AOL won't replace Explorer with Navigator in its AOL product in the immediate future. Instead AOL will start to promote and push Navigator in non-AOL branded sites and services, Bartels says.

#### THE FUTURE

Watch for browsers to become more logical and intelligent, analysts say. Browsers will incorporate more server-side functionality.

For example, the browser will be extended on the client to an application administration environment, such as document management on the browser, Schaller says.

He calls that the Internet desktop. And browsers will start to show up on other devices such as set-top boxes, he says. Browsers in general will become more aware of the portals that feed them, he says.

Into next year, Explorer will continue

to have the tremendous momentum of being the installed browser that comes with Windows, Bartels says.

But with the backing of AOL, "Navigator will give Microsoft more of a light for the browser market share of new installations of browsers and is likely to bolster the Netscape usage patterns of customers who have both browsers," Bartels says.

— Amy Mailly

## DATA WAREHOUSE SUITE STAKES

In 1998, database management system vendors announced products that let you crunch more data, faster, yawn. . . Wait a minute, they actually did something different, too. Their data warehousing tool suites opened some eyes.

"This was the year it finally happened. The important part of this is that they're integrated with the vendors' management tools. So the issues are there to build, manage and query a data warehouse," says Bob Craig, an analyst at Hurwitz Group Inc. in Framingham, Mass.

Most of the major DBMS vendors have refreshed their core products in the past year or so. The most recent developments were the fall announcements of Microsoft Corp.'s SQL Server 7 and Oracle Corp.'s Oracle9i.

SQL Server 7, scheduled for general availability by the end of last month, was pitched as a key step in moving Microsoft's database product beyond the workgroup and department level and into the enterprise level.

It features increased capacity, row-level locking, new management tools and online analytical processing capabilities, which may help to position it for data warehousing uses.

Oracle is promoting Oracle9i as an Internet-oriented database, making greater use of technologies such as Internet programming language HTML and a database resident Java virtual machine. It too was due for shipping by year's end.

#### WAREHOUSE? (THERE) HOW

However, Craig sees the improvement and integration of data warehousing tools as key developments in the market. He says the offering of integrated suites of tested warehousing tools will help user organizations get over a major hurdle in implementing data warehouses.

"In the past, you had to go to different vendors. If you were building a data warehouse, you were the integrator or you had to hire an integrator," he notes.

This year, don't look for major releases of the core database engines, Craig says.

dor and user support for meta data at the enterprise level, giving managers a more integrated look at data across varied applications.

— James Connolly

## SCOPING OUT ERP

The event that affected the enterprise resource planning (ERP) market arguably more than any other in 1998 was SAP AG's announcement that it plans to build a supply-chain planning product called SCOPE.

The announcement was made in September 1997, but "it effectively froze the market in 1998, which makes it the biggest announcement of the past year," says David Dobrin, a senior partner at Benchmarking Partners in Cambridge, Mass.

SCOPE — Supply Chain Optimization, Planning and Execution — is part of SAP's New Dimension platform, an integrated suite of business intelligence products that, when completed, will address business scenarios from sales force automation to managing customer relationships.

With the announcement, SAP got away from its single database model. "That in itself is new, but the effect that the announcement alone had on the market makes it one of the biggest stories of the year," Dobrin says. "SAP essentially stopped a number of supply-chain planning companies dead in their tracks — and [it] hasn't even come out with a product yet."

The competitor hit hardest probably was Manugistics Inc. in Rockville, Md. "Immediately after the announcement, their sales were delayed," Dobrin says. The other major ERP vendors — Baan Co., PeopleSoft Inc. and J.D. Edwards & Co. — all have entered the supply-chain market through acquisitions.

SAP is the only member of that group saying it will build its supply-chain product from scratch.

Also in the coming year, expect ERP vendors to make customer relationship management systems a top priority. The transaction system at the core of ERP systems already records customer interaction data, but harnessed that data into customer insight hasn't been possible.

That will change. Oracle Corp., Baan and SAP all have been busy acquiring companies and technologies to bolster their customer analytical systems. Actual products may not be seen for a couple of years, but that's where a good deal of the vendors' attention will be.

— Kevin Burdett

## WEB WATCHING

Headlines last year were abuzz with Web application announcements. "Oracle dives into Java," "Tools provide Web access to databases," "Sybase unveils development tools." Big net gets a kick of Web fever. "iSuite developer's pack ready to roll." The Web is omnipresent, and vendors will continue to react this year.

"What the concept of a Web application does is it allows users to have a more customized experience" on Web sites, says Ron Rappaport, an industry analyst at Zora Research Inc. in Redwood City, Calif. Companies will need to adapt their approach to Web site construction accordingly and use tools that are database-aware and so forth, he says. Look at a company like Oracle that has Internet-enabled its product line.

Web development tools rushed in at the beginning of last year, and according to analysts, we will see more results from those tools this year in the form of new applications on Web pages. "The reality is that there are going to be more Web sites in '99 running off databases," Rappaport says. "Oracle is going to be the big boat on that riding tide."

He adds that "you're going to create sites with the foreknowledge that the database is seen into interactivity at the site rather than just relying on apps. . . That database is part of the site that gets tapped and touched regularly."

As companies start to use the Web as a channel for supporting a wide variety of customer, supplier and employee interactions, the task of integrating Web front ends with existing back-end systems will continue to be a major theme this year, says Andrew Bartels, an analyst at Giga. But he emphasizes that "the issue is not at the front end/Web interface, it's the integration of that interface" itself.

Bartels also says we will see Web sites becoming more "customer friendly" — making doing business easier, online intuitive, faster, simpler and more secure.

"The type of Web applications you're going to see in '99 in the commerce arena won't simply focus on allowing a user to consummate a transaction, but rather to engage in the transaction that is linked to other Web sites," Rappaport says.

That will be the year "when E-commerce doubles or triples in dollar volume," and the number of companies with significant Web presence will grow two to three times, Bartels says.

But underlying all the viability and effectiveness of Web applications will be the adoption and embracement of XML, Rappaport says. "XML is a branch of HTML that has a few core tenants that will make it very valuable, very soon. The benefits of XML is a standard, and it's extensible. Anyone who extends it, extends it as a standard."

— Cathy Gaglio

Presented by:



Masters of  
the Web

To benefit:



the computer museum

Corporate Sponsors:



Daniels

Call Fishman Associates



HOME SITE



IPSWITCH  
Lucash, Gesmer  
& Updegrave, LLP



PRICEWATERHOUSECOOPERS



Trade Associations:



Sleep  
deprivation  
can make you  
hallucinatory,  
demented and  
delusional.



[Not to mention the world's best Web designer.]

Visit our gallery at [WWW.WEBMASTERS98.COM](http://WWW.WEBMASTERS98.COM) and see what the world's most talented Web designers can do in 24 hours of inspired, unbridled creativity. It's as if they had been saving their best work just for the Masters of the Web competition. And for helping seriously ill children. So drop by our gallery.

## In Depth

YEAR 2000:  
Never mind!

Hello, Boss? Remember that silly little Y2K matter?... Yeah, that's the one.... Oh, did I really call it "doomsday"? Are you sure I asked for that many millions? Well, I'll be damned.... Well, here we are in 2000 and everything's hunky-dory.... Yeah, turns out it was no big deal—can you believe that?... Hello, Boss? Boss? By Michael Cohn

IT'S JANUARY 2000 AND, BOY, do we feel stupid. We who whined about the year 2000. Who predicted fire and brimstone. And gloom and doom. And that the Washington Redskins would go 14-2.

Go ahead, all you naysayers, have a good laugh. All of you folks who listened to us as we implored you to spend a million or 40 renovating/replacing/remediating/upgrading all this year 2000 stuff.... and then nothing happened.

Because here we are, a wreck or two into 2000, and all is the same. Sure, we had a glitch here and there. A broken elevator. Traffic signals on the blink. A handful of lost luggage. But we'd lost luggage plenty before, and we'll lose some again. (Come to think of it, I'm still missing a green hooded sweatshirt from 1994. If anybody has seen it, let me know.)

So you folks go ahead and get on with your lives: get on with the work you postponed in '99 because of all your overblown millennium projects. But me, I have to spend the rest of this month eating crow. Govealing. Removing the egg from my face.

To be fair, it did look ugly for a while. So many companies were behind. Heck, so many countries didn't have a clue. CIOs were convinced that the thing was a hoax and that 25 million lines of RPG code could be regression-tested in a weekend. I was sure a crash-and-burn was imminent.

That's why I bet my career, my fortune—the whole enchilada—that you'd be reading this by candlelight. I gave up a great job making thirty-eight five. I jetisoned the Dow at 6,500. Now it's poised to hit 15,000, and all I've got left is a few hundred shares of year 2000-related stocks, which, all told, couldn't buy one item at the local every-thing's-a-buck store.

I was sure the Department of Defense would screw up. I was sure Los Angeles would screw up. I was sure the FAA would screw up. But all the date-related failure was a microwave on a flight to Fresno that overzapped portabella ravioli and turned them into little pasta pellets.

It was wrong. So sue me.

Whoa, whoa—don't get too literal on me there! Although I have to admit it's a safe bet somebody will sue somebody, this being America and all. The thousands of year 2000 lawyers who now have no plaintiffs, no litigations and no megabucks lawsuits surely will go after some poor schlub: it would be too hard for them to get back into ambulance-chasing shape after spending three years blathering to one another at conferences.

But don't waste your time with me. I stuck most of my holdings in Gold American Eagles back in '98, and now they're probably selling for less than \$200 an ounce. If not a pound.

All is not lost. Catastrophe may still be out there, somewhere. I could still hold out for Leap Day. Or 2/29/2000, which is either the first true eight-digit date of the millennium or a cheap way to dial long distance.

But what's the use? We've got this thing licked. We survived. World 1. Millenniumchondria n. Face it: Big projects are a piece of cake. Year 2000 was a cinch. The euro? Just a blip on the screen. And I hear they're getting ready to widen the Chunnel.

## NO DISASTER, NO RICHES

All of which now kind of puts a damper on the remaining bleak scenarios such as running out of phone numbers in 2025, running out of Social Security numbers in 2029 or running out of Social Security itself any day now. We Chicken Littles must now take our sorry keisters down to the unemployment office and see if anyone will have us. As coders. As project managers. As French friars.

But I'm not bitter. Honest. Had I been right, my bank balance would today be a negative number. I wouldn't be able to start my car. My power would be off. There would be looting, rioting and no presents under the tree. But instead, it's back to the store for me. To return my camping stove. And the 85 containers of propane. And the 40 cans of generic tuna, which is not even the solid white kind but rather the dark, oily stuff with lots of little gray pieces of whale. Or seaweed. Or whatever.

The next millennium beckons. Full of promise. Full of wonder. Off we go. For those who endured my centennial sermons in 1997, 1998 and 1999, thanks for listening. I was wrong. It's better this way. I didn't get to say, "I told you so."

I didn't make a million in code conversion. I didn't sock away a fortune on some patent to cram four digits into two by turning them sideways. I can return to life as I once knew it and get back to all the boring stuff that wasn't deemed mission-critical—the piles of documentation and junk mail that have been gathering dust since, oh, late '90 or so.

The hype is over. Year 2000 came and went. And with it went my once-in-a-lifetime opportunity to make a bundle. Alas, maybe something else will come along. But in the meantime, if anyone wants to buy a Year 2000 Countdown Clock, please let me know. □

Cohn was a year 2000 consultant and now would be happy if his headhunter would just return his calls.



## Jobs Forecast '99

# Pain Relief

IN 1999, IT PROFESSIONALS WILL STILL BE IN HIGH DEMAND, AND DEPARTMENTS WILL CONTINUE TO SUFFER LABOR PAINS. BUT SOME FOLKS HOLD OUT HOPE THAT THE DARKEST DAYS OF THE SKILLS CRUNCH MAY BE COMING TO AN END

BY BRONWYN FRYER

**I**T'S LIKE a recurring nightmare. When hiring managers and information technology recruiters look into their crystal balls for 1999, much of what they see is the same bad news. The tight labor market of the past few years will continue, they predict, and companies will keep working overtime to attract, hire and retain skilled technology workers.

But despite the gloom and doom, some observers see a slight easing of tension, particularly as year 2000-related repair work winds to a conclusion. "My sense is that the job market is cooling off a little bit," observes CIO John Keast at PG&E Corp. in San Francisco.

Keast gets this first whiff of a change in the skills climate from salary caps. Even in expensive, fast-paced West Coast territory, where a senior programmer can earn between \$90,000 and \$100,000 annually, "we're finding that we're not having to bump up against our upper levels for salary offerings quite as often," Keast says.

Computerworld's annual hiring survey bears out Keast's observation. In the 1997 survey (a forecast for 1998), 86% of participants said the difficulty of locating and hiring has resulted in an increased load on existing staff; in the 1998 survey, that percentage had dropped to 84%. Sure it wasn't a huge drop, but even a slight drop spells major relief in this market.

In fact, of the major impact areas from the IT skills shortage, hiring managers said things were slightly better on all counts. In the 1997 survey, 80% of those surveyed said that the hiring crunch had resulted in project delays; in the 1998 survey,



Pain Relief, page 112

PG&E CIO JOHN KEAST PREDICTS A SLOWER IT JOB MARKET IN '99



The Resources.

And a World of Options.

One person can't make a difference? Says who? At Comdisco, you'll define your own career path, have all the technological tools you can handle, and create powerful business solutions in an environment that's one of the most supportive around. So don't worry about running out of challenges anytime soon. Influencing a whole industry ought to keep you occupied for a while.

We currently have **Full-Time Opportunities at our Rosemont Headquarters** in the following areas:

- Business Continuity Planning, Desktop Asset Management, and Network Solutions
- Telecommunications Networks
- Financial and Trading Floor Technology
- Mainframe/Mid-Range Systems
- Client/Server Environment • Finance
- Accounting • Human Resources
- Marketing • Sales

To find out more information about the following positions, visit our Web site at: [www.comdisco.com](http://www.comdisco.com)

- Managing Consultants • Project Managers
- Service Delivery Directors • Senior Consultants
- Subject Matter Experts • System Engineers
- Account Managers • Programmer/Analysts
- HR Managers • Compensation Analysts
- Network Engineers • Administrative Assistants
- Portfolio Managers • Market Research Analysts

Other Comdisco locations:

**Minneapolis, Atlanta, Dallas, Denver, North Bergen & Woodcliff Lake, New Jersey, and Northern & Southern California.**

As a leading FORTUNE® 500 Technology Services company, Comdisco offers an attractive salary and benefits package. For consideration, please forward your resume, indicating position or area of interest, to: **COMDISCO, Dept. CW-010499, 6111 North River Rd., Rosemont, IL 60018** or FAX resume ("scannable," 12pt., standard font) in fine mode to: (888) 204-4256. E-mail as text to: [employ@comdisco.com](mailto:employ@comdisco.com)

**COMDISCO®**

A TECHNOLOGY SERVICES COMPANY

We are an equal opportunity employer. M/F/D/V





# Pain Relief

CONTINUED FROM PAGE 110

that number dropped to 66%. And although 58% of survey participants said they had to spend more time on recruiting in the 1997 survey, 57% made the same claim in the 1998 survey.

The hiring situation remains dire, to be sure. But the forecast for 1999 shows that relief may be on the way. The reasons for the slight cooling aren't yet clear, but some observers venture educated guesses.

Paul LeFort, CIO at Minneapolis-based health care giant United Wisconsin Services Inc., said that, as companies that started early begin to wind down their year 2000 conversion projects, new resources should become available.

"We're in reasonable shape for Y2K, and with the freed-up resources, we think we will pick up a year for development that will give us a jump on the competition," LeFort says.

Others think that the passage of H-1B visa status for IT workers from overseas may be helping. "The pool is beginning to be filled by foreign workers," says Mike Petosa, chief technology officer at Percon Systems Inc., a national IT recruiting firm. "The government's step to bring in people with specialized talents will help ease the stress."

## Difficult at best

Nevertheless, the frustration remains widespread. Just ask Heinz Bartsch, an IT recruiter at San Francisco-based Professional Consulting Network, which serves

large and small companies around Silicon Valley. Bartsch has been working at full capacity for two years to meet an unrelenting flood of demand, particularly for those with enterprise resource planning (ERP) skills.

"I just can't work enough to satisfy my clients," Bartsch says. "I'm making a ton of money, but I never see my wife and kids."

IT organizations all over the country are continuing to beat the bushes for hard-to-find specialists in Oracle, Windows NT, network administration, project management and Unix and Cobol programming.

Skills related to network and Internet technology remain hot: 40% of hiring managers are looking for people with a background in HTML, the Web programming language, followed by Internet development (38%). Windows NT Server (37%), Java (35%) and TCP/IP (32%).

Although the percentage of respondents reporting that they relied on contractors or temporary help to make ends meet fell in the 1998 survey to 60% from 63% the year before, the situation remains problematic for outsourcing firms, Bartsch says.

"Professional services firms are crying out for help, too," he says. "The Big Five are turning away business because they still don't have the staff to handle the work."

"The situation is difficult at best," confesses Rob Friedlander, a recruiter at IT consulting firm KPMG Peat Marwick LLP.

"We're trying to get smarter about how we hire, we're offering more money, and we want to make the hiring

## GOING FOR THE GOLD AND THE GLORY

The same two reasons top the list of why IT staffers leave, their managers say, but opportunity for advancement has risen in the rankings.

- |    |              |
|----|--------------|
| 74 | Compensation |
| 71 | Advancement  |

## IT'S GETTING BETTER, BUT NOT MUCH

While it's still tough recruit mg. IT talent, it may be easing a bit, according to the impact reported by IT managers.

IMPACT OF SKILLS SHORTAGE	98	99
Increased workload on existing staff	82	76
IT projects were delayed	70	67
Increased to any level for new IT hires	67	61
Hired temporary or contract personnel	60	62
Spent more time on recruiting	57	55

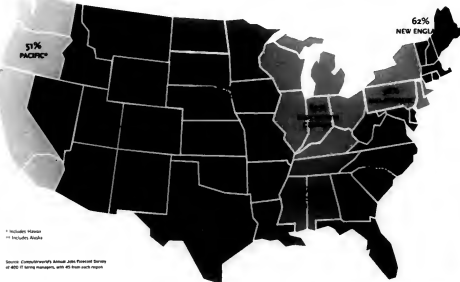
## THE TOP IT JOBS FOR 1999

Rankings, by title, of jobs that IT hiring managers say will be most in demand, by region

PACIFIC	MOUNTAIN	WEST NORTH CENTRAL	WEST SOUTH CENTRAL	EAST NORTH CENTRAL	EAST SOUTH CENTRAL	SOUTH ATLANTIC	MID-ATLANTIC	NEW ENGLAND
1. Network administrator	1. Senior programmer/analyst	1. Programmer/analyst	1. Network administrator	1. Network administrator	1. PC technical support specialist	1. Project manager	1. Network administrator	1. Network administrator
2. Project manager	2. Webmaster/ Web designer	2. PC technical support specialist	2. PC technical support specialist	2. Senior systems analyst	2. Network administrator	2. Senior programmer/analyst	2. Senior programmer/analyst	2. PC technical support specialist
3. PC technical support specialist	3. Senior systems analyst	3. Network administrator	3. Programmer/analyst	3. Project manager	3. Senior programmer/analyst	3. Senior systems analyst	3. Project manager	3. Programmer/analyst
4. Senior programmer/analyst	4. PC technical support specialist	4. Webmaster/ Web designer	4. Project manager	4. PC technical support specialist	4. Programmer/analyst	4. Network administrator	4. PC technical support specialist	4. Project manager
5. Programmer/analyst	5. Programmer/analyst	5. Senior programmer/analyst	5. Senior systems analyst	5. Senior programmer/analyst	5. Project manager	5. PC technical support specialist	5. Senior systems analyst	5. Senior systems analyst
6. Senior systems analyst	6. Project manager	6. Project manager	6. Senior programmer/analyst	6. Programmer/analyst	6. Webmaster/ Web designer	6. Programmer/analyst	6. Programmer/analyst	6. Senior programmer/analyst
7. Computer operator	7. Technical support manager	7. Senior systems analyst	7. Webmaster/ Web designer	7. Webmaster/ Web designer	7. Senior systems analyst	7. Webmaster/ Web designer	7. LAN manager	7. Webmaster/ Web designer
8. Webmaster/ Web designer	8. Computer operator	8. Technical support manager	8. Technical support manager	8. LAN manager	8. LAN manager	8. LAN manager	8. Computer operator	8. Technical support manager
9. Technical support manager	9. Network administrator	9. LAN manager	9. Computer operator	9. Computer operator	9. Computer operator	9. Technical support manager	9. Local computer operator	9. Computer operator
10. Computer operations manager	10. Computer operations manager	10. Manager of Internet technology	10. Manager of Internet technology	10. Technical support manager	10. Technical support manager	10. Computer operator	10. Technical support manager	10. Computer operations manager

## THE BEST JOB MARKETS

The number of hiring managers expecting to increase their IT staffs in the coming year has risen by as much as 17% in some regions. Here are the percentages of companies expecting to increase IT hiring in 1999:



\* Includes Hawaii  
\*\* Includes Alaska

Source: Computerworld's Annual Jobs Forecast Survey  
of 402 IT hiring managers, with 45 from each region

process as short as possible. But I don't think anything is going to change much."

## Get what you pay for

For 1999, the quality of IT recruits remains a vital issue. Some observers feel that many IT hiring managers mistake paper for professionalism, preferring to hire inexperienced folk with certificates or spanking-new degrees. "I know companies that are pulling in a lot of MBAs with very little computer background," says Frank Olivas, a senior consultant and ERP specialist at Indus International Inc. in Atlanta. "You can have a Ph.D., but it means nothing if you haven't seen the different flavors of Unix."

Keast agrees, adding that finding people who can focus on IT and business "is not getting any easier." He's desperately seeking people with a solid understanding of both technology and business, who with some experience under their belts are worth far more than legions of inexperienced collegiates.

"I'll take any good, experienced project manager that comes our way," Keast says.

The perceived shortage of talent is keeping salaries high. In 1998, high salaries remained a chief tool that companies used to reel in recruits; 74% of managers reported that the primary rea-

son for staff turnover is "compensation." Accordingly, it's no surprise that 85% of hiring managers surveyed say they expect salaries to increase in 1999.

Skyrocketing salaries have made life especially hard on organizations that lack the funds to compete. Bill Branch, director of the 120-person department of computer services and telecommunications at the University of Central Florida, says he has spent two years searching for someone to do LAN and WAN administration for the school. "I've been trying to adjust salaries to attract the types of people we need, but it's been very difficult," he says.

And despite the comfortable university environment, Branch says it has been tough to hold on to people. "Just today, I had one employee resign," he sighs. "He was offered a \$14,000 increase plus a 4% bonus if he stayed a year."

Aside from its seductive value, money is also being used as a means to keep people from job-hopping. Olivas received more than 700 telephone calls from recruiters before he accepted a new job at Indus, a multivendor firm that builds software for the utility industry. Some companies, he says, resorted to misleading advertising. Olivas recalls that one firm had touted a \$100,000 signing bonus for IT professionals. "I went to their home page and found out that the bonus was to be spread out over three years, presumably to keep you there," he says.

## Think differently

But money isn't everything. Many companies have already learned that quality of life is becoming at least as important as money in reeling in skilled personnel.

One characteristic that attracted Olivas to Indus was its creative compensation package for IT professionals who must travel. Olivas receives equivalent time off for every day he spends away. "When you're on the road so much, having extra time away from work is a real benefit," he says.

United Wisconsin creatively increased what LeFort calls the IT "gene pool." One unusual internal training program, the United Wisconsin University, offers "try before you buy" IT courses to employees in other, nontechnical departments such as sales. "One night a week, they get a primer course on systems; if they're interested, they can enroll in the real program," LeFort explains. So far, the investment in training has paid off. This year, he predicts, "We'll still be in the middle of a daylight to find the 400 best people, but I like our odds." □

Fryer is a freelance writer in Santa Cruz, Calif. Her book, *The Unofficial Guide to Buying a Computer*, will be published in 1999 by Macmillan Publishing USA, a Simon & Schuster company.

## THE SKILLS THEY WOULD KILL FOR

If managers say the following are the skills they most want but have the hardest time finding:

- 74 Oral
- 70 Microsoft Windows NT
- 65 Network administration
- Project management
- 61 Java
- 59 C++
- 57 Database administration
- 56 Network programming

## TOP SLOTS FOR CONTRACTORS

If managers say the following are the most contract-heavy skills they need right now:

- 65 Java
- 61 C++
- 57 Network programming
- 56 Database administration
- 55 Project management
- 54 Perl
- 53 C
- 52 C#



# Pain Relief

CONTINUED FROM PAGE 110

that number dropped to 16%. And although 28% of survey participants said they had to spend more time on recruiting in the 1997 survey, 57% made the same claim in the 1998 survey.

The hiring situation remains dim, to be sure. But the forecast for 1999 shows that relief may be on the way. The reasons for the slight cooling aren't yet clear, but some observers continue educated guesses.

Paul Tebrak, CIO at Minneapolis-based health care giant United Western Services Inc., said that as companies that started early begin to wind down their 1998 conversion projects, new resources should become available.

We're in reasonable shape for Y2K, and with the freed-up resources, we think we will pick up a year for development that will give us a jump on the competition," Tebrak says.

Others think that the passage of H1B visa status for IT workers from overseas may be helping. "The pool is beginning to be filled by foreign workers," says Mike Petrus, chief technology officer at Percom Systems Inc., a national IT recruiting firm. "The government's step to being in people with specialized talents will help ease the stress."

## Difficult at best

Nevertheless, the frustration remains widespread. Just ask Heinz Ratsch, an IT recruiter at San Francisco-based Professional Consulting Network, which serves

large and small companies around Silicon Valley. Ratsch has been working at full capacity for two years to meet an insatiable flood of demand, particularly for those with enterprise IT source planning (ERP) skills.

"I just can't work enough to satisfy my clients," Ratsch says. "I'm making a ton of money, but I never see my wife and kids."

IT organizations all over the country are continuing to beat the bushes for hard-to-find specialists in Oracle, Windows NT, network administration, project management and Unix and Cobol programming.

Skills related to network and Internet technology remain hot. 40% of hiring managers are looking for people with a background in HTML, the Web programming language, followed by Internet development (48%), Windows NT Server (37%), Java (41%) and TCP/IP (42%).

Although the percentage of respondents reporting that they relied on contractors or temporary help to make ends meet fell in the 1998 survey to 66% from 61% the year before, the situation remains problematic for out-sourcing firms, Ratsch says.

"Professional services firms are crying out for help too," he says. "The Bug Fix are turning away business because they still don't have the staff to handle the work."

"The situation is difficult at best," confesses Rob Friedlander, a recruiter at IT consulting firm KPMG Peat Marwick LLP.

"We're trying to get smarter about how we hire, we're offering more money, and we want to make the hiring

## GOING FOR THE GOLD AND THE GLORY

The same two reasons top the list of why IT staffers leave, their managers say, but opportunity for advancement has risen in the rankings:

74% Compensation  
73% Advancement

## IT'S GETTING BETTER, BUT NOT MUCH

While it's still tough recruiting IT talent, it may be easing a bit, according to the impacts reported by IT managers.

IMPACT OF SKILLS SHORTAGE:	'98	'99
Increased workload on existing staff	84%	86%
IT projects were delayed	66%	80%
Increased salary level for new IT hires	63%	66%
Hired temporary or contract personnel	60%	63%
Spent more time on recruiting	57%	58%

Source: A.C. Nielsen, "Computerworld Jobs Forecast '99," Computerworld, Jan. 8, 1999.

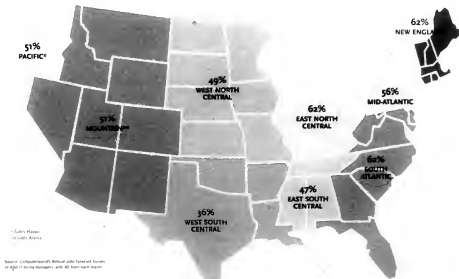
## THE TOP IT JOBS FOR 1999

Rankings, by title, of jobs that IT hiring managers say will be most in demand, by region

PACIFIC	MOUNTAIN	WEST NORTH CENTRAL	WEST SOUTH CENTRAL	EAST NORTH CENTRAL	EAST SOUTH CENTRAL	SOUTH ATLANTIC	MID ATLANTIC	NEW ENGLAND
1. Network administrator	1. Senior programmer/analyst	1. Programmer/analyst	1. Network administrator	1. Network administrator	1. PC technical support specialist	1. Project manager	1. Network administrator	1. Network administrator
2. Project manager	2. Webmaster/Web designer	2. PC technical support specialist	2. PC technical support specialist	2. Senior systems analyst	2. Network administrator	2. Senior programmer/analyst	2. Senior programmer/analyst	2. PC technical support specialist
3. PC technical support specialist	3. Senior systems analyst	3. Network administrator	3. Programmer/analyst	3. Project manager	3. Senior programmer/analyst	3. Senior systems analyst	3. Project manager	3. Programmer/analyst
4. Senior programmer/analyst	4. PC technical support specialist	4. Webmaster/Web designer	4. Project manager	4. PC technical support specialist	4. Programmer/analyst	4. Network administrator	4. PC technical support specialist	4. Project manager
5. Programmer/analyst	5. Programmer/analyst	5. Senior programmer/analyst	5. Senior systems analyst	5. Senior programmer/analyst	5. Project manager	5. PC technical support specialist	5. Senior systems analyst	5. Senior systems analyst
6. Senior systems analyst	6. Project manager	6. Project manager	6. Senior programmer/analyst	6. Programmer/analyst	6. Webmaster/Web designer	6. Programmer/analyst	6. Programmer/analyst	6. Senior programmer/analyst
7. Computer operator	7. Technical support manager	7. Senior systems analyst	7. Webmaster/Web designer	7. Webmaster/Web designer	7. Senior systems analyst	7. Webmaster/Web designer	7. LAN manager	7. Webmaster/Web designer
8. Webmaster/Web designer	8. Computer operator	8. Technical support manager	8. Technical support manager	8. LAN manager	8. LAN manager	8. LAN manager	8. Computer operator	8. Technical support manager
9. Technical support manager	9. Network administrator	9. LAN manager	9. Computer operator	9. Computer operator	9. Computer operator	9. Technical support manager	9. Lead computer operator	9. Computer operator
10. Computer operations manager	10. Computer operations manager	10. Manager of Internet technology	10. Manager of Internet technology	10. Technical support manager	10. Technical support manager	10. Computer operator	10. Technical support manager	10. Computer operations manager

## THE BEST JOB MARKETS

The number of hiring managers expecting to increase their IT staffs in the coming year has risen by as much as 17% in some regions. Here are the percentages of companies expecting to increase IT hiring in 1999:



process as short as possible. But I don't think anything is going to change much."

### Get what you pay for

For 1999, the quality of IT recruits remains a vital issue. Some observers feel that many IT hiring managers mistake paper for professionalism, preferring to hire inexperienced folk with certificates or spanking new degrees. "I know companies that are pulling in a lot of MBAs with very little computer background," says Frank Olivas, a senior consultant and ERP specialist at Indus International Inc. in Atlanta. "You can have a Ph.D., but it means nothing if you haven't seen the different flavors of Unix."

Keast agrees, adding that finding people who can focus on IT and business "is not getting any easier." He's desperately seeking people with a solid understanding of both technology and business, who with some experience under their belts are worth far more than legions of inexperienced colleagues.

"I'll take any good, experienced project manager that comes our way," Keast says.

The perceived shortage of talent is keeping salaries high. In 1998, high salaries remained a chief tool that companies used to reel in recruits. 74% of managers reported that the primary ac-

tion for staff turnover is "compensation." Accordingly, it's no surprise that 84% of hiring managers surveyed say they expect salaries to increase in 1999.

Skyrocketing salaries have made life especially hard on organizations that lack the funds to compete. Bill Branch, director of the 120-person department of computer services and telecommunications at the University of Central Florida, says he has spent two years searching for someone to do LAN and WAN administration for the school. "I've been trying to adjust salaries to attract the types of people we need, but it's been very difficult," he says.

And despite the comfortable university environment, Branch says it has been tough to hold on to people. "Just today, I had one employee resign," he sighs. "He was offered a \$14,000 increase plus a 4% bonus if he stayed a year."

Aside from its seductive value, money is also being used as a means to keep people from job-hopping. Olivas received more than 70 telephone calls from recruiters before he accepted a new job at Indus, a midsize firm that builds software for the utility industry. Some companies, he says, resorted to misleading advertising. Olivas recalls that one firm had touted a \$100,000 signing bonus for IT professionals. "I went to their home page and found out that the bonus was to be spread out over three years, presumably to keep you there," he says.

### Think differently

But money isn't everything. Many companies have already learned that quality of life is becoming at least as important as money in reeling in skilled personnel.

One characteristic that attracted Olivas to Indus was its creative compensation package for IT professionals who must travel. Olivas receives equivalent time off for every day he spends away. "When you're on the road so much, having extra time away from work is a real benefit," he says.

United Wisconsin creatively increased what LeFebvre calls the IT "game pool." One unusual internal training program, the United Wisconsin University offers "try before you buy" IT courses to employees in other, nontechnical departments such as sales. "One night a week, they get a primer course on systems, if they're interested they can enroll in the real program," LeFebvre explains. So far, the investment in training has paid off. This year, he predicts, "We'll still be in the middle of a dogfight to find the 400 best people, but I like our odds." □

Frijet is a freelance writer in Santa Cruz, Calif. Her book, *The Unofficial Guide to Buying a Computer*, will be published in 1999 by Macmillan Publishing USA, a Simon & Schuster company.

### THE SKILLS THEY WOULD KILL FOR

IT managers say the following are the skills they most want but have the hardest time finding:

- 34% Oracle
- 20% Microsoft Windows NT
- 16% Project administration
- 12% Project management
- 11% Unix
- 10% Cobol
- 10% Database administration
- 10% Network management

### TOP SLOTS FOR CONTRACTORS

IT managers say they will most need contract help in the following job positions:

- 1. Project manager
- 2. Senior programmer/analyst
- 3. Network administrator
- 4. Webmaster/Web developer
- 5. Programmer/analyst

## IT CAREERS

You know you're not really  
going to jog 15 miles a day.



write the test code or  
that spy in code.



or give up your favorite  
choice of technology.



but **You can** keep your resolution  
to find a better job.

## Management Consulting Services

SAP® PeopleSoft®  
Oracle® Package  
Implementation  
SalesForce® Automations  
Supply Chain  
Management Systems  
Client/Server  
Development  
Infrastructure  
Architects/DBAs  
Electronic Commerce  
Data Warehousing  
Data Modeling  
Strategic Change

## Do You Know Jason?

He works with Cindy & Denise.  
You remember them. CW 1998 & 1999  
Together, they have over 40 years  
of LS recruiting experience.

They work for us.  
Where do you work?  
Maybe you should call Jason.  
Or Cindy, or Denise.  
Get to know them.  
Get to know us.

**DataMasters®**  
You should meet our people.

Yeah, we've got all that...  
• Mainframe & PC positions  
• Contract & Permanent  
• Medical/Dental/401(k)  
• Referral Bonuses  
• Location, Location, Location



Business Solutions — People & Technology

800-DATAMASTERS Fax: 336-373-1501

PO Box 1648 Dept. CW Greensboro, NC 27415-0548

<http://www.datamasters.com>

[info@datamasters.com](mailto:info@datamasters.com)

## JOE WALTERS Extreme technologist SINCE 1985

At Metastar IT's formerly COMSYL, we have  
a name for the best-of-the-best in information  
technology. Extreme technologists. Not clutter  
about it. IT programmers and software  
developers are the most sought-after  
people in today's job market.

Metastar IT's puts the best people where  
the best jobs are. ACROSS THE U.S. Into life.

• Package Applications (SAP PeopleSoft)  
• Network Operations • Web-based Technologies  
• Mainframe/Legacy

If you think you are an "Extreme  
Technologist" and are ready to  
move to a higher level, we

want to talk to you. Visit our website at [www.metastar-it.com](http://www.metastar-it.com) for more information

**METASTAR**  
INFORMATION TECHNOLOGY SERVICES

FAX YOUR RESUME TO 1-800-615-0175 TODAY!  
DIRECT YOUR RESUME TO C81294

Equal Opportunity Employer



## IT CAREERS



Billy Anders

by day.

[microsoft.com/jobs/usa.htm](http://microsoft.com/jobs/usa.htm)

**Microsoft**

Where do you want to go today?

COMPUTERWORLD  
careers

computerworldcareers.com

99th Annual  
Desert  
CALIFORNIA  
COMPUTERWORLD  
June 8-9  
1999  
1-800-488-9204

When was  
the last time  
a great job  
*found you?*

That's what we thought.

You already know Computerworld as a great resource for career opportunities. Now we're bringing you Computerworld Career Central, the service where the jobs find you.

If you're a software development professional, visit [www.computerworldcareers.com](http://www.computerworldcareers.com), fill out a Member Profile and submit it. We'll find jobs matched to your skills, experience and preferences and send them to you, confidentially, via e-mail. Computerworld Career Central is the hassle-free, cost-free way we do the work so you don't have to job matching service that works.

You work hard enough. Go to [www.computerworldcareers.com](http://www.computerworldcareers.com) and let us do the rest.

**COMPUTERWORLD**  
Career Central  
[www.computerworldcareers.com](http://www.computerworldcareers.com)





## IT CAREERS MIDWEST

[illegible]

Please send a resume and three professional references to Mr. Gerald E. Davis, Asst. Director of Administration & Computing, Lock Haven University, Lock Haven, PA 17745-2900. We will begin Jan. 4, 1999 and will continue until the position is filled. EOE/AAE/DFWP/Equal Opportunity. Affirmative Action Employer and minorities and women are encouraged to apply. Equal Opportunity Employer. Minorities and women are encouraged to apply. Equal Opportunity Employer. Minorities and women are encouraged to apply.

[illegible]

**Programmer/Analyst**

Design and develop computer systems and programs on mainframe, IBM, and PC's. C, C++, and Oracle database provide technical support to customer solutions code and implement products and programs. Develop, test, and develop new features and functionality for products and services work on assessment and create solutions of XGS issues. Computer support with user experience or equivalent in C#, C++ or EE 6 months or above experience in job offered or in computer communications. **Proficiency in C/C++ or Java or Oracle or DB2 Database Systems** \$63,000/yr. Contact Equate Alex Samuels, ELSA Technical Recruiting, P.O. Box 740000, Atlanta, GA 30307-4000. Fax (404) 525-7000. **EEO/AAE**

**Programmer/Analyst** (J001)  
830-161-014 client sites -  
Durham & Raleigh areas, NC  
Analyze design & develop  
applications based on client  
server architecture Design develop  
& maintain relational  
database systems prepare docu-  
mentation Environment: Unix  
Oracle PL/SQL, C, C++, Pro/C  
Batchelor in Comp. Sci/Math  
Engg - 2 yrs exp 3058/y  
Innov. 9-5 Some remote or  
social security # to JO  
NC/217733 Job Service 700  
Wade Ave P.O. Box 27027  
Raleigh NC 27611

**COMPUTERWORLD**  
careers.com

99  
TECHNICAL  
RECRUITING  
& RETENTION  
CONFERENCE  
COMPUTERWORLD

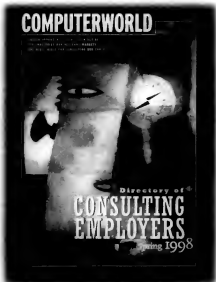
June 6-9, 1999

# Palm Desert

## CALIFORNIA

1-800-488-9204

# Find I.T. Consulting Careers Here



**COMPUTERWORLD**  
c@reers

computerworldcareers.com

## GIVE YOURSELF THE BEST GIFT IN TOWN

a career in IS at Southeast  
Medical Alliance!

The following newly created 1999 opportunities are now available with one of the most successful, locally owned managed care companies, SMA, whose products include SmartPlan and SmartPlan 65. Join a leading team of outstanding IS professionals headed by Mr. Philip D'Antonio, CIO. We feature competitive salaries and excellent employee benefits opportunities available for career growth and development.

### Sr. Programmer Analyst Programmer Analyst Programmer

On the above positions Oracle, Windows 95, MS Office Pro and RAR experience preferred. Qualified candidates send resume, email or fax with cover letter to: Southeast Medical Alliance, 111 Veterans Memorial Blvd., Suite 500, Metairie, LA 70005. Fax (504)835-5295. Email: chodgeson@sma.net. Website: www.sma.net/recruiting.

**SMA**  
Southeast Medical Alliance  
A Division of HCA Healthcare Corporation

## COMPUTER SCIENCE

Moore College invites applications for a full-time, tenure-track position in Computer Science starting Fall Semester 1999. Duties include undergraduate teaching, advising students, and committee work. A graduate is preferred, but master's will be considered. The Computer Science major includes a broad range of courses, and consideration is being given to the inclusion of an Information Technology track. This position will help determine and shape the direction of our computer science/electronics program.

Candidates must be strongly committed to the mission of Moore College, which is to provide quality education for students desiring to integrate faith and learning within a Christian worldview, and in the context of the liberal arts. Send applications to: Dr. Betty Dutton, Moore College, 515 25th Street NW, Warren, OH 44789. Consideration of applications will begin January 25, 1999 and will continue until the position is filled.

Moore College is a Christian college for the Arts, Sciences and Professions affiliated with the Evangelical Free Church-Eastern Region and is an Equal Opportunity Employer. MFFHY

## PROGRAMMERS

### IBM MAINFRAME

Programmer/analysts with COBOL, CICS, LAMP/RECE plus and use of VSAM files.

### CLIENT SERVER

Programmer/analysts with Windows, NT/95, Visual Basic, 4.0, 5.0, SQL, Service, MS Access, Crystal Reports.

Send resumes to: United American Insurance Company, 2750 S. Stearns Drive, Metairie, LA 70002. Fax: (504) 885-9800. Email: (504) 885-9800.

Or Email to: arley@unitedaia.com

**COMPUTERWORLD**  
c@reers

computerworldcareers.com

**COMPUTERWORLD**  
c@reers

computerworldcareers.com

## IT CAREERS

## SAP PROFESSIONALS

# THE # BEST

spearhead

June 6-9  
1999

99  
SAP  
& APPLICATION  
CONFERENCE  
COMPUTERWORLD

Palm  
Desert  
CALIFORNIA

1-800-488-9204



The sizzling Telecom Corridor in the Dallas/Fort Worth region is where skills can help you apply directly and confidentially to any or all 170 high-tech companies. Don't know anything about the Dallas/Fort Worth region? Visit skills and you'll discover that this region has nationally recognized public schools, a sunny climate, low cost of living and has an abundance of available activities. You already know that Texas has no state income tax, didn't you?

▲ No State  
Income Tax

▲ Low Cost  
of Living

▲ Superior  
School  
System

▲ Moderate  
Climate

▲ High Pay,  
Competitive  
Job Market

## TECHNICAL PROFESSIONALS

WE HAVE IMMEDIATE OPENINGS FOR THE FOLLOWING

OPTICAL/PHOTONIC	SOFTWARE DEVELOPERS
ENGINEERS	PROGRAM MANAGERS
WIRELESS/RF ENGINEERS	SOFTWARE/HARDWARE
DSP ENGINEERS	ENGINEERS
SYSTEM ENGINEERS	WEB DEVELOPERS
ELEC. DESIGN ENGINEERS	

Apply Now! Log On to eJobs!

[www.ejobs.com/telecomcorridor](http://www.ejobs.com/telecomcorridor)

So which company fits your area of expertise? Skills can answer that. Skills is a versatile new job site that offers a multitude of services for the job seeker. It provides direct access to over 170 companies in the Telecom Corridor, all of which are hiring qualified technical professionals.

The instant you cut and paste your resume into Skills, you can choose to apply directly and confidentially to companies in the Telecom Corridor. All participating companies offer relocation assistance. So make the change to skills and change your present and your future. **DSG**



TELECOM  
CORRIDOR  
DALLAS/FORT WORTH, TEXAS



a service of GLOBAL EMPLOYER'S NETWORK, INC.

# FIND I.T. Consulting Careers HERE

COMPUTERWORLD



[computerworldcareers.com](http://computerworldcareers.com)

COMPUTERWORLD  
careers

# HOW AMBITIOUS ARE YOU?

Driven.

Focused.

Intense.

Voracious.

**TECHNICAL FOREIGN ASSIGNMENT**

Are you qualified and interested in supervising our M.I.S. group in a Middle Eastern country? You should be a proficient COBOL programmer, must enjoy working directly with users, and be able (after training), to provide systems and configuration support for AS400 and Windows NT platforms. IBM mid-range experience would be helpful but is not required. Initially assigned to the Dallas M.I.S. staff, this position requires periodic travel to and a two-year future assignment in the Middle East.

Hunt Co. offers an excellent compensation and benefits package based upon background and experience, and this foreign assignment provides additional compensation and tax advantages. Interested candidates should forward their resume and salary history in confidence to Hunt Co. Company, Attn: Human Resources, 1445 Ross at Ford, Dallas, Texas 75202.

EOE M/F/D/V

**COMSYS**

COMSYS is a leader in the field of software development and support. We are currently seeking experienced software developers and support staff for our Dallas office. The ideal candidate will have a strong background in software development and support, and will be able to work independently. We offer a competitive salary and benefits package. If you are interested, please send your resume to: COMSYS, 1445 Ross at Ford, Dallas, Texas 75202. EOE M/F/D/V

**SPL**

SPL is an Equal Opportunity Employer. We are currently seeking experienced software developers and support staff for our Dallas office. The ideal candidate will have a strong background in software development and support, and will be able to work independently. We offer a competitive salary and benefits package. If you are interested, please send your resume to: SPL, 1445 Ross at Ford, Dallas, Texas 75202. EOE M/F/D/V

Software engineer with 3 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

Software engineer with 5 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

Software engineer with 3 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

Software engineer with 3 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

Software engineer with 3 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

Software engineer with 3 years of experience as a software engineer in computer professional, who will develop new systems, applying computer science engineering and mathematical analysis, with 5 years of experience using SAP-R3 and ABAP. Salary: \$120,000.00 per year, 9:00 am - 5:00 pm. Send resume, listing, job order number 1007076, to Mr. John Loring, Manager, Pittsburgh Job Center, 320 Bypass Drive, Pittsburgh, PA 15206.

## Positions Supporting Computer Products

Computer Products is seeking experienced professionals for the following positions:

- Field Sales Support
- Sales Managers
- Software Field Sales Reps
- Enterprise Sales Executives
- Project Managers
- Software Testing Architects

## Careers in Consulting

Computer Products is seeking experienced professionals for the following positions:

- Field Sales Support
- Sales Managers
- Software Field Sales Reps
- Enterprise Sales Executives
- Project Managers
- Software Testing Architects

## IT CAREERS



Every day, technology is having a greater impact on how people live, work and exchange ideas. At SBC Communications, the parent company of Southwestern Bell and Pacific Bell, we're harnessing the power of innovation and using it to benefit the daily lives of our 90 million customers around the world. And nowhere is this kind of forward thinking more important than in our IT department.

To find out more about an IT career with Southwestern Bell or Pacific Bell, and to explore our current opportunities, visit our IT Web page, SBC Communications is an Equal Opportunity Employer. All qualified applicants will receive full and fair consideration for employment.



—A Communications Division—

Southwestern Bell

PACIFIC BELL

## FIND I.T. Consulting Careers HERE



computerworldcareers.com

COMPUTERWORLD  
careers

www.over50000hightechjobs.com

www.dice.com



Real Jobs. Real Fast. DICE: 515-386-1144



Working hard. Playing harder. There's one team that naturally enjoys both. Wal-Mart. Whether we're creating applications in a multi-platform atmosphere or engineering our 24-terabyte data warehouse, our IT Associates are making a technological impact with industry-wide. In fact, Computerworld just named Wal-Mart as one of the top ten places to work in IT. But the picture gets more scenic, it's all set among the beauty of the Ozarks. Explore it all through the following positions, using:

- DBMS - C, C++, Database Administration, Engineering, PowerBuilder, Informatica, 4GL
- PC Workstations - VB, VC++, NT, SQL Server, Java
- IBM Mainframes - COBOL, CICS, IMS & IMS Database Administration
- Networking - Ethernet, VSAE, Frame Relay, ATM
- Telecommunications Technology

Wal-Mart offers an excellent base line package, including stock options, and a very competitive salary. If having the best of both worlds—advanced technology and natural amenities—interests you, send us your resume and cover letter to:

Wal-Mart Information  
Systems Division  
Attention: Recruiting Department  
OSWCN  
702 S.W. 365 Street  
Bentonville, Arkansas 72716-9650

Fax: 361-275-4879

E-mail:  
mktg@wal-mart.com

For more information, call toll free  
1-888-888-526  
or check out our career page at  
www.wal-mart.com/careers/itd

SEE 101/109

WAL-MART

COMPUTERWORLD  
careers

computerworldcareers.com

COMPUTERWORLD  
careers

Software engineer with 6 months of experience as a site engineer or computer professional who will develop and test systems, applying computer science engineering and mathematical analysis with 6 months of experience using SAP R/3. Analyze use and patterns testing and use training after development. Extensive travel and frequent relocation. Bachelor's degree in one of several limited fields: engineering, mathematics, computer applications, or physics. \$110,000/yr. 40 hours/wk. 9:30 am - 5:30 pm. Send resumes noting job order number 0555601 to M. Richard Ingraham, Acly Manager, County Job Center, 132 Merchants Street, Suite 1000, San Diego, CA 92101.

Software engineer with 5 years of experience as a site engineer or computer professional who will develop and test systems, applying computer science engineering and mathematical analysis. Relating supervision of other computer professionals with 5 years of experience using Unix and Oracle RDBMS with 2 years of experience with Oracle Database Administration PL/SQL and SQL. The candidate will design and perform testing and user training after development. Extensive travel and frequent relocation. Bachelor's degree in one of several limited fields: engineering, mathematics, computer applications, or physics. \$90,000/yr. 40 hours/wk. 9:00 am - 5:00 pm. Send resumes noting job order number 1035254 to Local Office Manager, Job Center, 346 Park Avenue, New York, NY 10017.

computerworldcareers.com

COMPUTERWORLD  
careers



WWW.MICRON.COM

## IMPACT

That's what your ideas will have at Micron.

Micron Technology, Inc. has a global presence in the semiconductor industry. The satisfaction of working here goes beyond the expected. It's more than technological breakthroughs, interaction with professionals who respect each other, and the lack of bureaucracy. It's the way your contributions will affect the end result. We have the following career opportunities:

**Database Administrator**—Requires 2+ years of DBA experience preferably in manufacturing using large relational DBMS (Sybase, Red Brick and Oracle preferred), and a B.S. in C.S. or a related field. Knowledge of data modeling tools, data normalization principles, and data warehouse administration desired.

**Systems Administrator/Manager**—Requires experience with one or more of the following: VMS, AIX, Unix, and NT servers/systems. Also requires experience in installing hardware/software and systems troubleshooting, and a B.S. in C.S. or a related field.

**Software Engineer**—Design and develop software in business or manufacturing systems. Requires experience in development of client/server and/or Web development. Visual Basic, C++, Delphi, Fortran, Sybase, SQL, Crystal Reports, HTML, Java, CGI, Windows NT, Unix, and Vax and a B.S. in C.S., C.I.S. or M.I.S.

**Customer Support Analyst**—Provide technical support for internal & external customers. Degree preferred. Lingual ability in Cantonese, Japanese or Italian is a plus.

**Field Service Engineers**—2-year C.S. degree/certificate with experience installing/configuring/maintaining PC systems and networks. Experience with DOS, NT, Windows, Mac and OS/2 preferred.

**Network Specialist**—Implement/maintain network infrastructures, equipment. Troubleshoot/implement routers, switches and hubs.

For all positions, equivalent experience considered in lieu of degree.

Micron offers highly competitive compensation and excellent benefits, including medical/dental/vision coverage, profit sharing, stock purchase, and 401(k). To join the team of professionals at Micron, send your resume and a cover letter indicating your area of interest to: Fax: (206) 359-4641 — Attn: Dept. #22 E-mail: [hr@micron.com](mailto:hr@micron.com); Mail: Micron Technology, Inc., 8040 S. Federal Way, P.O. Box 6, 98147-0006, Seattle, WA 98147-0006. Justice: (206) 352-4891.

**MICRON.**

INCORPORATED

Where the future is built daily.

126 AA

## FIND I.T. Consulting Careers HERE



computerworldcareers.com

COMPUTERWORLD  
careers

## A WORLD OF OPPORTUNITY

Your technology career may have just begun. Or you may be an experienced software professional. What you need is a company that offers you diverse opportunities in technology services and project management, while keeping you from getting technically obsolete. That company is Mastech.

Mastech represents global opportunity with a fast-track company that promotes opportunities in our consulting practice ranging from Y2K project management to client server based system development. If you have proven IT skills, and are interested in a challenging position working to support some of the world's largest organizations, we may have just the opportunity for you.

### Client Server

- Unix System Admin
- Object Oriented Dev
- NT System Admin

### Yr 2000 Services

- Project Managers
- Prog Analyst/Code, Database

### Internet/Intranet

- Java HTML
- EDI

### ERP

- BAAN
- SAP
- Oracle Apps
- JD Edwards
- PeopleSoft

Join one of the industry leaders in IT Services with revenues over \$100 million. Mastech has been recognized by Inc. magazine as one of the fastest-growing privately held companies four times. Now a public entity, our client base spans over 400 companies including EDS, KPMG, IBM, Ernst & Young and Cap Gemini, who rely on our expertise to achieve their goals. We are looking for dynamic individuals to play an integral role in supporting the growth of our consulting efforts.

Mastech provides a compensation plan structured to encourage and reward top performers and a full benefit program. Please fax your resume and salary history to: Mastech Corporation, Attn: National Recruitment, Fax: (412) 490-9641; Ph: (412) 490-9191; E-mail: [ExploreTheWorld@mastech.com](mailto:ExploreTheWorld@mastech.com); EOE.

**MASTECH**

www.mastech.com

## IT CAREERS

Your Employer's Contract Is About Up...

## Do You Know Where Your Career Is?

PKS Information Services has full-time career opportunities for versatile mainframe programmers with at least 3 years experience in COBOL, COBOL II, CICS and DB2 with a background in analysis and specification writing.

Join an international company that provides full-service computer outsourcing, systems integration and enterprise Internet services. PKS has an extremely strong benefit and incentive plan and fosters a culture of empowering its employees to provide excellence in service.

PKS Information Services is a subsidiary of Level 3 Communications, Inc.

Fax your resume to: 973-568-3078; or email it to [isomb@pk sis.com](mailto:isomb@pk sis.com)



[www.pk sis.com](http://www.pk sis.com)

WEB • RENEWAL • COMPUTER OUTSOURCING • APPLICATION MAINTENANCE  
DATA ARCHIVING • SOFTWARE DEVELOPMENT

Reach 100,000  
I.T. Students

Spring Career Edition  
Recruiting of  
Level Employers

Advertising Deadline: February 2

COMPUTERWORLD  
CAREERS

Call 1-800-343-6474, x8000



## When was the last time a great job found you?

That's what we thought. You already know Computerworld as a great resource for career opportunities. Now we're bringing you **Computerworld Career Central**, the service where the jobs find you.

If you're a software development professional, visit [www.computerworldcareers.com](http://www.computerworldcareers.com), fill out a Member Profile and submit it. We'll find jobs matched to your skills, experience and preferences and send them to you, confidentially, via e-mail.

Computerworld Career Central is the hassle-free, cost-free, we-do-the-work-so-you-don't-have-to job matching service that works.

You work hard enough. Go to [www.computerworldcareers.com](http://www.computerworldcareers.com) and let Computerworld Career Central do the rest.

**COMPUTERWORLD**  
 **Career Central™**  
[www.computerworldcareers.com](http://www.computerworldcareers.com)





For information on  
advertising,  
call 800-343-6474

## Marketplace

# ATTENTION!

**Attention!** will page you,  
or call you on the phone  
when critical system  
or network  
problems occur.

- ✓ Supports UNIX, Windows NT, Windows 9x, and Open VMS
- ✓ Notification via numeric and alpha pagers, telephones, and custom methods
- ✓ Interfaces with all leading system network management products
- ✓ Unlimited escalation guarantees the right people are attention
- ✓ Personnel call it to *Attention!* to acknowledge receipt of page
- ✓ Fault tolerant design supports redundant *Attention!* servers for immediate failover
- ✓ Event filtering suppresses redundant notification for same problem
- ✓ Heartbeat monitoring guarantees systems and critical applications are running 24x7

[www.attentionsoftware.com](http://www.attentionsoftware.com)

ATTENTION  
Software

2175 N. Academy Circle • Suite 100 • Colorado Springs, CO 80909  
(719) 594-9100 • Fax (719) 594-9100

call for free demo software 800-684-1684

## Try Our Proven I.T. Certification Training...

Discover the fastest and easiest way to prepare for I.T. certification. Our Self-Study computer-based training courses provide a learning environment that surpasses traditional classroom and video courses. To prove it, we're offering a free demo disk of our CBT courses to I.T. professionals who call today!

- MCSE
- MCSE+Internet
- MCP
- Cisco
- Intro to Network
- A+ Certification
- MCSO
- Visual C++
- C++
- Oracle
- And More!
- CNE
- Novell CIP
- CNA
- UNIX
- Web Master
- Intro to PC
- Visual Basic
- Java
- COBOL
- Office 97

- Gain Valuable Skills, Knowledge and Technical Reputation
- Open the Door to Great Career Opportunities
- Raise Your Income
- Study at Your Own Pace
- Interactive Hands-on Exercises
- Receive One-on-One Training Consulting

**I.T. Professionals Call Now to  
Get Your FREE Demo Disk!  
1-800-475-5831**

**FOREFRONT  
DIRECT**  
A CBT Group Company

25400 US Hwy 19 N., #285 • Clearwater, FL 33703

Copyright © 1998 CBT Group, Inc. All rights reserved. Forefront Direct, the Forefront Direct logo and Forefront Direct Self Study Course are trademarks of CBT Group, Inc. All other trademarks are the property of their respective holders. Printed in the U.S.A. MCSE



**Seeking Microsoft Certification?**

The path to Microsoft Certification is a tricky one. What you need is direction. Jack and the Transcender team of exam simulation experts can lead you through the short cuts, switchbacks and treacherous paths of the Microsoft exams. Pass our exam and fail to pass Microsoft's and we'll give you your money back. Guaranteed.

**Transcender, America's #1 Exam Preparation Software.**

- Realistic MCSE & MCSO Questions
- From \$129 - \$179
- Money Back if You Don't Pass Guarantee\*
- Detailed Answers & Explanations
- Questions in Microsoft's References
- Predictive Score Reports

[www.transcender.com](http://www.transcender.com)

**To order call Jack @ (615) 726-8779 or fax (615) 726-8884  
242 Louise Ave., Nashville, TN 37203**

**CUSTOMER PERSONALITY TEST & ANALYSIS SOLUTION**

We are currently providing VM, JMS, Management Systems who need to analyze various Computing, Your System Software Configuration Test Environment, Tape Operations, Systems Programming & Networking Support Services

**www.alicomp.com**

Visit our website, or for more information call 800-274-5556.

**♦ SELL ♦ LEASE**

**NEW & REFURBISHED Compaq™/DEC™ EQUIPMENT**

**Systems • Peripherals • Compatibles**

- ♦ Competitive Pricing
- ♦ Experienced Staff
- ♦ Custom Systems Integration
- ♦ In-House Tech Support

**COMPUX SYSTEMS**

Easton, Massachusetts

Toll Free: 800.426.5499 Tel.: 508.230.3700 Fax: 508.238.8250  
e-mail: [sales@compux.com](mailto:sales@compux.com)

COMPUX and DEC™ are registered trademarks of Digital Equipment Corporation. Compaq Systems is an affiliate with Digital Equipment Corporation. All other trademarks are the property of their respective holders. Printed in the U.S.A.

**♦ SELL ♦ LEASE**



**What's holding up your network?**

**What should be.**



**NetCom**

When it comes to network storage furniture, you have a lot of options. But if you're looking for a solution that will keep your network operating at peak capacity, there's only one choice: NetCom3.

NetCom3 is the only furniture flexible enough to change as rapidly as your network changes. Without disrupting your operations. So you're assured of a solution that works as well today as it will tomorrow.

You expect a lot from your network. Expect as much from your network furniture. NetCom3. The choice is clear.

**edp**

Engineered Data Products

We Link People and Technology

**1-800-4321-EDP** [www.edp-usa.com](http://www.edp-usa.com)

For information on  
advertising,  
call 800-343-6474

# Marketplace

MCSE

# FREE!

FOR A LIMITED TIME ONLY

## MCSE Exam Simulation Software by TestOut!

If you're interested in earning your Microsoft MCSE credential, then call us at 1 800-877-4889 today for your free TestOut! MCSE Starter Kit. Your kit contains:

**Free TestOut! MCSE Exam Simulation Software** for all six MCSE exams. This software will help you learn about Microsoft's MCSE testing objectives and you'll be able to score yourself on simulated MCSE exams. You will know exactly where you stand!

**A free TestOut! MCSE Guidebook** to show you how our new self-study, multimedia TestOut! MCSE Courses on CD-ROM can help you earn your MCSE credential on a self-study basis.

There's no risk to this offer. Just call us today and we'll be happy to send you your TestOut! MCSE Starter Kit free of charge. We're TestOut! Corporation and we're here to help you earn your MCSE credential on a self-study basis. Remember, this is a limited time offer, so give us a call today!

## TestOut!

CORPORATION

CALL NOW  
(800) 877-4889 ext. 278  
www.testout.com

TestOut! MCSE Courses on CD-ROM • 16 South Main • Boston, MA 02111

**The Computerworld Marketplace ...**  
**Where IT Leaders go to shop!**

Filled each month with a variety of offers from IT vendors, the Computerworld Marketplace offers you one stop shopping for everything you need: training programs, software, peripherals, storage, Internet/intranet products, uninterruptible power supplies, enterprise faxing products and more!

You buy for the enterprise, we want to make your job easier. Let us know what products and services you'd like to see advertised in the Computerworld Marketplace in 1999. Please call Laurie Gomes at 1-800-343-6474, ext. 8249 or e-mail at laurie\_gomes@cw.com.

## 100% COMPATIBLE COMPRESSION



# PKZIP MVS



The same algorithmic technology that made PKZIP DOS famous now drives enterprise networks onboard OS/390 CMO5 processors.

With PKZIP MultiPlatform from ASI, you can compress and transfer data across 11 platforms from MVS to Windows. In today's harsh open systems climate, it's much more than just something nice to have.

Start your **FREE EVALUATION** today.

**888-278-2203**  
EXTENSION 200



© 1998, Partner  
in Development

ASCENT SOLUTIONS Inc. Internet: [www.ascent.com](http://www.ascent.com) E-mail: [info@ascent.com](mailto:info@ascent.com)

AS 400 • OS/390 • MVS • NetWare • OS/2 • Windows • VMS • VSE • zSeries

## ADVERTISERS INDEX

American Power Conversion <a href="http://www.apc.com">http://www.apc.com</a> .25	Deloitte & Touche Consulting Group (DC) <a href="http://www.deloitte-us.com">http://www.deloitte-us.com</a> .34	New Horizons . . . . . C4 <a href="http://www.newhorizons.com">http://www.newhorizons.com</a>
BBN 300-APCC <a href="http://www.bbn.com">http://www.bbn.com</a> .100	Gateway 3000 .100-105 <a href="http://www.gateway.com">http://www.gateway.com</a>	OptiSystems . . . . . 10 <a href="http://www.optisystems.com">http://www.optisystems.com</a>
Avient Software . . . . . 38 <a href="http://www.avient.com">http://www.avient.com</a>	Heurtek-Packard . . . . . 18-19 <a href="http://www.heurtek.com">http://www.heurtek.com</a>	Oracle Corp . . . . . 12-13 <a href="http://www.oracle.com">http://www.oracle.com</a>
CCShare . . . . . 39 <a href="http://www.cshare.com">http://www.cshare.com</a>	IBM . . . . . C3, 30-31 <a href="http://www.ibm.com">http://www.ibm.com</a>	Plexus . . . . . 38-39 <a href="http://www.plexus.com">http://www.plexus.com</a>
Citrix . . . . . 38 <a href="http://www.citrix.com">http://www.citrix.com</a>	Intel . . . . . 3 <a href="http://www.intel.com">http://www.intel.com</a>	PLATINUM Technology . . . . . 11 <a href="http://www.platinum.com">http://www.platinum.com</a>
CompuLink Computer Corp. <a href="http://www.compu-link.com">http://www.compu-link.com</a> .96	Lucent Technologies . . . . . 36 <a href="http://www.lucent.com">http://www.lucent.com</a>	SAS Institute . . . . . 35-37 <a href="http://www.sas.com">http://www.sas.com</a>
Computer Associates <a href="http://www.cai.com">http://www.cai.com</a> .12-13	Masters of the Web . . . . . 108 <a href="http://www.mastersoftheweb.com">http://www.mastersoftheweb.com</a>	SQRBI Technologies . . . . . 104 <a href="http://www.sqrbi.com">http://www.sqrbi.com</a>
CompuShare . . . . . 9 <a href="http://www.compu-share.com">http://www.compu-share.com</a>	Microsoft . . . . . C6 <a href="http://www.microsoft.com">http://www.microsoft.com</a>	Symantec . . . . . 5 <a href="http://www.symantec.com">http://www.symantec.com</a>
Data Interface . . . . . 95 <a href="http://www.data-interface.com">http://www.data-interface.com</a>	Millennium 18 <a href="http://www.millennium.com">http://www.millennium.com</a>	Toshiba . . . . . 34-35 <a href="http://www.toshiba.com">http://www.toshiba.com</a>

\*Regional Select Edition

## NEXT 10 YEARS INDEX (LOCAL, NATIONAL, EUROPE, ASIA & MEX)

ACUCORP . . . . . 72 <a href="http://www.acucorp.com">http://www.acucorp.com</a>	CEINCOM . . . . . 76 <a href="http://www.ceincom.com">http://www.ceincom.com</a>	Oracle Corp . . . . . 8 <a href="http://www.oracle.com">http://www.oracle.com</a>
ASPECT . . . . . C1 <a href="http://www.aspect.com">http://www.aspect.com</a>	Heurtek-Packard . . . . . 30-31 <a href="http://www.heurtek.com">http://www.heurtek.com</a>	Platinum Software . . . . . 87 <a href="http://www.platinum.com">http://www.platinum.com</a>
Cisco . . . . . 13 <a href="http://www.cisco.com">http://www.cisco.com</a>	Information Builders . . . . . C4 <a href="http://www.ibm.com">http://www.ibm.com</a>	QAD . . . . . 21 <a href="http://www.qad.com">http://www.qad.com</a>
Computer Associates . . . . . 12-13 <a href="http://www.cai.com">http://www.cai.com</a>	IMS . . . . . 36 <a href="http://www.ims.com">http://www.ims.com</a>	Software Tech Corp. . . . . 40 <a href="http://www.stc.com">http://www.stc.com</a>
Dell . . . . . 6-7 <a href="http://www.dell.com">http://www.dell.com</a>	Lockheed Martin . . . . . C4 <a href="http://www.lockheed.com">http://www.lockheed.com</a>	StarLine . . . . . 44 <a href="http://www.starline.com">http://www.starline.com</a>
Forte . . . . . 48 <a href="http://www.forte.com">http://www.forte.com</a>	NetScout . . . . . 21 <a href="http://www.netscout.com">http://www.netscout.com</a>	Symantec . . . . . 5 <a href="http://www.symantec.com">http://www.symantec.com</a>

This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.








Get a free evaluation CD and information package, and find more about e-commerce at [www.software.ibm.com/eci](http://www.software.ibm.com/eci)

## Want to get customer and supplier systems playing as a team?

You want to take advantage of the exciting opportunities e-business offers, but incompatible platforms, networks and apps stand in the way. TXSeries™ from IBM makes it possible for information systems to work together simply and securely. It works within your company, and between you and your customers, suppliers and distributors. TXSeries provides unbeatable connectivity to your existing IT investments, enabling the Web to work for you. TXSeries even includes MQSeries, which allows you to connect your applications across over 35 different platforms. TXSeries is capable of centrally administering multiple servers, eliminating single points of failure, and ensuring that applications are always available. It's also completely scalable, handling over 50% of the world's Web-based stock transactions. TXSeries incorporates security features that eliminate the need for programmers to develop large amounts of code. In other words, TXSeries will do all the hard work of connecting your information systems while you concentrate on managing your team. To find out more about TXSeries, visit [www.software.ibm.com/tseries](http://www.software.ibm.com/tseries).


**IBM**

Solutions for a small planet™



STATISTICS SHOW  
TRAINED EMPLOYEES  
ARE SIX TIMES MORE  
PRODUCTIVE THAN THOSE  
WHO AREN'T.

{ AND THAT'S WITHOUT ANY  
CAFFEINE AND SUGAR }



According to the Gartner Group, untrained users take six times as long to perform tasks. Multiply that by your staff time to support them, and you can see why our computer training pays for itself in just a few months.

As the world's largest network of authorized training centers, with more than 200 locations around the globe, New Horizons Computer Learning Centers® offer more desktop and technical classes than anyone else. Our professional instructors are rated by every student, every day. And our help desk is available for desktop support 24 hours, 365 days a year.

To see how our guaranteed training can make your employees (and your IT staff) more productive, call 1 800 PC-LEARN, or visit [www.newhorizons.com](http://www.newhorizons.com) for your free guide. **CHOICES FOR THE REAL WORLD.**



**New Horizons®**  
Computer Learning Centers

© 1998 New Horizons Computer Learning Centers. All trademarks are the property of their respective owners.